CARIS

DIRECTORY OF

AGRICULTURAL RESEARCH INSTITUTIONS AND PROJECTS IN WEST AFRICA

PILOT PROJECT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

CARIS

CURRENT AGRICULTURAL RESEARCH INFORMATION SYSTEM

PILOT PROJECT 1972-73

DIRECTORY OF

AGRICULTURAL RESEARCH INSTITUTIONS AND PROJECTS IN WEST AFRICA

CARIS PROJECT - FAO - ROME - ITALY - 1973

FOREWORD

Throughout the world there is an increasing interest in research.

In the industrial field, technical improvement developed in some countries can be exported to others where they may be applied almost without adaptation.

The situation is quite different as regards improvements in the agricultural field. These are linked with crops, climates, soils and often with the social context. Thus, technical improvements can only be obtained through research done within the countries which will profit from this research or in countries where climate and soil conditions are similar.

Since in many areas the climates, soils and crops are the same, a large amount of money and time can be saved, even if sometimes the results of these researches need to be adapted to the special conditions existing in the country where they are to be applied.

To avoid this waste of money and time, the Sixteenth Session of the FAO Conference (Rome, 6-25 November 1971), by Resolution 9/71, requested the Director-General to submit a proposal relating to the exchange of information between Member Nations and institutions both in research and the related fields of development, in order to promote scientific and technological advancement of agriculture in developing countries.

Following this recommendation, the Consultative Group on International Agricultural Research has shown great interest in information on current agricultural research in the world and chiefly in these countries. This is the purpose of the CARIS project (Current Agricultural Research Information System).

Before recommending a world-wide system, the Consultative Group proposed to members that a small-scale pilot project be financed in order to set up a methodology.

The pilot project was implemented, with the same objectives of a broader world-wide project, i.e. to collect and disseminate information on research institutions and stations on the on-going research projects in the fields of agriculture, animal production, forestry and inland fisheries.

In order to simulate one sector of the CARIS project as closely as possible to the full scheme, the coverage of the pilot project has been limited to nations of West Africa associated in WARDA (West African Rice Development Association).

The reasons for this choice were that this area contains typical problems of developing countries. In this area there are 200 research institutions and stations of different types and sizes. Research is undertaken under various climatic and soil conditions and in numerous subject areas. The data are very varied and presented in two languages. The CARIS pilot project is not only a test, but also a further example of the cooperation of the countries associated in WARDA, working together on the improvement of rice cultivation. This example could be readily followed in other sectors of agricultural research.

The pilot project was begun in March 1972. The first six months were mainly devoted to the study of possible methodologies and to the preparation of the data collecting. To this end, questionnaires were drawn up and contacts made with the organizations prepared to cooperate in the project.

The subsequent six months were devoted to data collection. Questionnaires were sent to Research Institutions and immediately on return sent to England or France for translation. The collected data related to 237 Research Institutions or Stations and 1555 Research Projects.

The last period was occupied by the data processing. Two complete versions have been prepared: one in English by the Smithsonian Science Information Exchange (SSIE)

using its existing operational system, another in French by CARIS staff according to a methodology especially set up for CARIS during the preceding period. In addition, 300 research project descriptions have been sent to the Current Research Information System (CRIS) of the U.S. Ministry of Agriculture, 300 to the Information and Documentation Centre (CID) of the Commission of the European Communities and 30 to the Centre d'Informatique appliquée au développement de l'agriculture tropicale (CIDAT) for sample studies. Contacts have been made with the CID to attempt to bring about compatibility between the two agricultural research information systems under study (AGREP and CARIS).

The pilot project does not end with the publication of the two directories. The International Development Research Centre (IDRC) is to carry out an evaluation of the methodologies, of the results of the pilot project and conduct a user survey. The results of this work will provide a definitive methodology which could be used for a future world-wide CARIS project.

The CARIS pilot project has been carried out as the result of a remarkable effort of international cooperation.

The Food and Agriculture Organization of the United Nations would like to acknowledge:

— the countries and institutions that have supported the financing of the project, in the form of cash, secondment of personnel and services: the Belgian and French Governments, the Rockefeller Foundation, the Agency for International Development of the U.S. Department of State (USAID), the Commission of the European Communities, the Agence de cooperation culturelle et technique, the Conseil international de la langue française, the Overseas Development Admistration, the Commonwealth Agricultural Bureaux and the International Development Research Centre;

— the Governments of the following West African countries, which have agreed to cooperate in providing information through their research stations and have accepted consultants who have assisted in data collection: Dahomey, Gambia, Ghana, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo, Upper Volta;

— the research institutions and all the scientists, quoted in this directory, who have given their help and have provided the basic data.

FAO hopes that the present directory will be useful, not only for the member countries of WARDA but also for all other countries where research is going on in the same fields. This is the real objective of the CARIS system, one that will be fully attained when this system is set up on a world-wide basis.

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PART 1
RESEARCH PROJECTS

INTRODUCTION TO PART 1

This part of the Directory was prepared by the Smithsonian Science Information Exchange (SSIE), Washington, D.C., U.S.A., for the Food and Agriculture Organization of the United Nations. Selection of countries included in the Directory and collection of the research summaries was carried out by FAO. The summaries were indexed by the Exchange's staff of professional scientists and were entered into a special data base from which this Directory was generated on magnetic tape prior to printing. This publication is intended to illustrate the type of Directory which could be generated from similar, ongoing research records on a world-wide basis, although a publication developed in such a case would probably be prepared in several selected subject areas rather than as a single volume covering the entire field of agricultural research.

The RESEARCH PROJECT SECTION of the Directory is organized alphabetically by country and by research station within country. Detailed address information is included for each station and an FAO/CARIS identification number follows the name of the principal investigator for each project. The information which appears in the summaries was taken directly from the project records as received by SSIE. Each project is assigned a sequential accession number (i.e., 1.0001, 1.0002, 1.0003, etc.) which is used in the four subsequent indexes for easy reference to specific projects.

In the SUBJECT INDEX each project title is indexed to an average of 6 terms alphabetically arranged in hierarchies reflecting relationships between broader and narrower concepts. These are as specific as the language of the project permits. Extensive cross-referencing of terms appearing in the various hierarchies is also provided for the user. When terms appear as other than a main hierarchical term, the main reference term is preceded by the word "See":

e.g. Grafting
See Plant Physiology

When terms appear both as a main hierarchical term and elsewhere as other than a main term, the reference terms are preceded by the words "See Also":

e.g. Phosphorous
See Also Isotopes
Radioactive Isotopes

The titles of all projects indexed to each subject term follow that term. A number of other descriptive terms relevant to the project and the accession number assigned to the project in the RESEARCH PROJECT SECTION appears after each title, thus by reviewing the terms following each title the reader can more easily identify projects of probably high interest.

In order to keep the Directory size within reasonable limits, indexing terms were limited to an average of six major terms and for this reason certain printed subject terms which might otherwise be useful entry points to the subject index have been combined. For example studies on:

- cattle, sheep, goats and swine will be found under Animal Husbandry.
- economic plants will be found under the corresponding type of crop — rubber, under industrial crops; groundnuts, under oil seed crops; cowpeas, under pulse crops; cotton under fiber crops; coffee and cocoa, under beverage crops; rice, millet, grain sorgum and maize, under cereal crops; oil palm, under oil seed crops; yams, under root crops; kenaf, under fiber crops; and okra, under leafy and fruit-type vegetables.
- soil fertility studies involving nitrogen, phosphate or potassium as well as general fertility studies, and chemical deficiencies in soils, will be found under the appropriate "management" topic in the Agronomy, Forestry or Horticulture sections of the index.

The EXECUTIVE AGENCY INDEX consists of a single alphabetical listing. Executive agency captions were limited in length to 42 characters by the computer file used to store the source documents. Thus, in some instances abbreviations had to be used. City and country names are included for most agencies, although a city or country name was not repeated if it appeared as part of the agency name. In those few instances in which the agency name was unusually long and the data field had room for only a city or country name, the one thought to be most useful was chosen.

While the RESEARCH PROJECT SECTION identifies only the principal investigator, all investigators cited on the source document are included in the INVESTIGATOR INDEX. In the INVESTIGATOR SPECIALTY INDEX, an investigator appears once under each specialty with which he was associated in the source document. Investigators not associated with a scientific specialty on the source document were excluded from the INVESTIGATOR SPECIALTY INDEX. In both indexes, an asterisk is used after the project accession number to designate the principal investigator. Both indexes are arranged alphabetically, the former by name, the latter by name within specialty.

DESCRIPTION OF RESEARCH TASKS

DAHOMEY

CENTRE IRAT DE COTONOU

B.P. 422, Cotonou

1.0001, SUITABILITY FOR RICE OF THE SOILS OF THE MARSHY LANDS OF NORTH DAHOMEY

R. DUMONT, (DM.021.0001)

OBJECTIVE: Adaptation of varieties to the local ecology.

APPROACH: Research work carried out at the outstations of Bagou, Logozohe. Collection of varieties. Parallel statistical experiments (3 varieties, 2 levels of fertility) on two different dates. Fertilization: role of organic matter; working of the soil; potential fertility: N, P and K curves; maintenance of P and K fertility.

RESULTS: Different types of rice cultivation have been specified, with their techniques and their appropriate varieties. Very great advantage of varieties with a high production potential in the conditions of low-lying ground without much flooding.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0002, SPECIFIC ROLE OF ORGANIC MATTER

R. WERTS, (DM.021.0002)

OBJECTIVE: Demonstration of the specific role of organic matter as a fertility factor. Influence on the efficacy of the nitrogenous fertilizer.

APPROACH: Research carried out on the outstations of Hinvi, Abomey, Save, Angaradebou. Setting up a curve of response to nitrogen with or without ploughing in of moistened organic matter (test made on Gramineae, using the best varieties available).

RESULTS: 1) Great efficacy of the moistened organic material. 2) Clear-cut action of the nitrogen, irrespective of the level of organic material (in the presence of P2O5 and K2O).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0003, ACTION OF THE TILLAGE ON THE PHYSICAL FACTORS OF FERTILITY

R. WERTS, (DM.021.0003)

OBJECTIVE: Better knowledge of the techniques for preparation and for working of the land as a theme for intensification of agriculture.

APPROACH: Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou. 2 or 3 modalities for tillage (of which one reference control, traditional methods of cultivation) in the presence of several levels of fertility (experiment on Gramineae, using the best varieties available).

RESULTS: Possible interaction between tillage and levels of fertility.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0004, POTENTIALITIES OF TROPICAL SOILS

R. WERTS, (DM.021.0004)

OBJECTIVE: To measure the production potential of the soil when the mineral deficiencies have been corrected.

APPROACH: Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou. Curve of response to nitrogen in the presence of a uniform P2O5 plus K2O fertilizer (on Gramineae, using the best varieties available).

RESULTS: The No. 1 limiting factor for yields is the climatic factor and particularly water (quantities and distribution of rainfall) whence a rather weak potential.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0005, CORRECTION OF DEFICIENCIES IN P2O5

R. WERTS, (DM.021.0005)

OBJECTIVE: To determine the rates of application capable of correcting deficiencies of soils in P2O5.

APPROACH: Response curve to P2O5 in the presence of a uniform N plus K2O fertilization (on Gramineae, using the best varieties available). (Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou).

RESULTS: P2O5 is the No. 1 limiting factor for fertility in Dahomey. In certain instances (debased Bore lands) P2O5 constitutes the basis of a reparation fertilizer, in others a relatively weak maintenance fertilization is sufficient.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0006, CORRECTION OF DEFICIENCIES IN K2O

R. WERTS, (DM.021.0006)

OBJECTIVE: To determine the rates of application capable of correcting the deficiencies of soils in K2O.

APPROACH: Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou. Curve of response to K2O in the presence of a uniform N plus P2O5 fertilization (on Gramineae, using the best varieties available).

RESULTS: The deficiency in K2O exists essentially in overcropped lands, or whenever cotton is a feature of the rotation. Relatively low rates of application, but repeated, (K2O is poorly stored) enable the correction of this deficiency.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0007, MAINTENANCE OF P2O5 AND K2O FERTILITY

R. WERTS, (DM.021.0007)

OBJECTIVE: To determine, after correction of the mineral deficiencies, what are the fertilizations to apply to the crops to maintain fertility.

APPROACH: Test of a maintenance fertilization after several levels of correction (in the case of P2O5). Test of several levels of maintenance fertilization after 2 levels of correction (in the case

of K2O). (Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou).

RESULTS: Recourse to a restitution fertilizer is strictly necessary only for certain soils and for P2O5 only. For the other soils and for K2O the maintenance fertilizations are of more value.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0008, NITROGEN BALANCE IN TROPICAL SOILS
R. WERTS, (DM.021.0008)

OBJECTIVE: Study of means of modifying the level of nitrogen reserves of the soils (ploughing in straw). Maximum profitability of the nitrogenous fertilization.

APPROACH: Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou. Application of 3 levels of N in the presence of 2 levels of non-moistened organic matter. On Gramineae, (maize, sorghum, forage crops) using the best varieties available.

RESULTS: 1) Little benefit from the non-moistened organic material. 2) Very clear-cut activity of the nitrogen, in the presence of P2O5 plus K2O.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0009, MODALITIES OF USE OF NATURAL TOGO PHOSPHATE
R. WERTS, (DM.021.0009)

OBJECTIVE: As P2O5 is the No. 1 limiting factor in tropical soils and the Togo phosphate a cheap source of P2O5, the object is to establish a technique for the utilization of this phosphate.

APPROACH: Research work carried out on the outstations of Hinvi, Abomey, Save, Angaradebou. 1) Demonstration of the possible efficacy of this phosphate in relation to the more soluble forms. 2) Combinations between different rates of application of natural phosphate and of imported phosphates to improve the efficacy.

RESULTS: 1) Very clear interest of the natural phosphate especially in soils very deficient in P2O5. 2) Deferred effect, 12 to 24 months. 3) Possibility of clear and rapid improvement of the efficacy of the natural phosphate by light applications of more soluble phosphates.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0010, MAINTENANCE AND REGENERATION OF FERTILITY OF THE DEGRADED "TERRE DE BARRE" SOILS
R. WERTS, (DM.021.0010)

OBJECTIVES: After restitution of the fertility, to establish conditions for use of these lands.

APPROACH: Research work carried out on the outstation of Meridjonou: Determination, then correction of the deficiencies; advantage of organic material; maintenance of fertility.

RESULTS: Limiting factors are P2O5, then K2O. Advantage of composted organic material. Possibility of redressing the deficiencies and maintaining fertility. Advantage of the Togo phosphates.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

INSTITUT FRANCAIS DE RECHERCHES FRUITIERES OUTRE-MER

Mission au Dahomey, B.P. 89, Abomey

1.0011, ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE
G. MONTAGUT, (DM.140.0001)

Objective: Definition of species of fruit trees adapted to the climatic zone, of their performance, of the utilization of the products.

Approach: Specific experimental arrangements, situated in chosen mesoclimatic sites, for the study of the adaptability of species of fruit trees cultivated as homogeneous populations or as associations: citrus trees (lemons and limes), avocado, mango, guava, cashew, grenadill and, a plant whose fruits contain a sweetening principle, Synsepalum dulcificum.

Results obtained: Renewal of the citrus orchard, thanks to the introduction, multiplication and distribution of plant material free from the principal known virus diseases and representing the best commercial varieties. Definition of the techniques for multiplication and for cultivation of citrus trees (principally the lemon tree for essential oil) in the Centre (province of Zou). Multiplication and creation of plantations of Synsepalum dulcificum with a view to a technological study. In the North, definition of the mode of plantation and creation of "populations" of Anacardium (cashew-nut tree). Awaited: Definition of the suitability for fruit-growing of the different climatic zones of Dahomey and of the techniques for cultivation with a view to the creation of agro-industrial unit-types for production.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Dahomey

SECTEUR IRCT CENTRE DAHOMEY

B.P. 144, Abomey

1.0012, HERBICIDE EXPERIMENTATION ON COTTON
C. THEVIN, (DM.043.0001)

National Network project: See DM. 042.0001. (1.0026)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0013, STUDY OF THE MINERAL DEFICIENCIES OF THE COTTON PLANT
C. THEVIN, (DM.043.0002)

National Network project: See DM. 042.0002. (1.0027)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0014, EXPERIMENTS ON POTASSIUM FERTILIZATION OF COTTON
C. THEVIN, (DM.043.0003)

National network project: See DM. 042.0003. (1.0028)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0015, EXPERIMENTS WITH NATURAL PHOSPHATES OF ANECHO (TOGO)
C. THEVIN, (DM.043.0004)

National Network project: See DM. 044.0004. (1.0022)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0016, COMBINED EXPERIMENTS, TREATMENTS X FERTILIZATIONS, ON COTTON
C. THEVIN, (DM.043.0005)
National network project: See DM. 044.0005. (1.0023)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0017, STUDY OF THE NITROGEN NUTRITION OF THE COTTON PLANT
C. THEVIN, (DM.043.0006)
Network project: See DM. 044.0001.(1.0019)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0018, EXPERIMENTATION WITH VARIETIES OF COTTON
C. THEVIN, (DM.043.0007)
Network project: See DM. 042.0005. (1.0030)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

SECTEUR IRCT NORD-DAHOMEY

B.P. 172, Parakou

1.0019, STUDY OF THE NITROGEN NUTRITION OF THE COTTON PLANT
A. JOLY, (DM.044.0001)

Objective: To get to know the requirements in nitrogen of the cotton plant in the course of its development. Investigation of the critical periods, by excess or by deficiency, and of a better control of vegetative growth.

Approach: 4 experiments with 7 materials - 6 to 8 repetitions - Fisher blocks; every 10 days with graduated pauses, according to the materials, 3, 5, 7, 9 or 11 applications after sowing. Increased insecticidal protection. Investigation of nutrition by foliar analysis every 10 days. In Northern Dahomey, trials at Alafiarou, Gomparou, Angaradebou.

Results: Determination of doses (rates) and periods of application of the nitrogenous fertilizer. Demonstration of the uselessness of applications beyond the 60th day.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0020, STUDY OF THE MINERAL DEFICIENCIES OF THE COTTON PLANT
A. JOLY, (DM.044.0002)
Network project: See DM. 042.0002. (1.0027)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0021, EXPERIMENTS ON POTASSIUM FERTILIZATION OF COTTON
A. JOLY, (DM.044.0003)
National network project: See DM. 042.0003. (1.0028)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0022, EXPERIMENTS WITH NATURAL PHOSPHATES OF ANECHO (TOGO)
A. JOLY, (DM.044.0004)

Objective: To compare the Togo phosphate with bicalcium phosphate on a complete quadrennial rotation (Borgou) or at increasing rates of application (Zou). To compare the application as a basic fertilizer, at the start of rotation, and the fraction as an annual application of phosphate fertilizer.

Approach: 4 experiments - Fisher blocks - 6 materials - 6 to 8 re- petitions (Borgou). 1 experiment - Fisher blocks - 7 materials - 6 repetitions (Zou). 4 rows per plot - 2 central ones tested. Borgou: To a basic fertilizer NSKBo, is added 200 kg/ha of bicalcium phosphate or 330 kg of natural Togo phosphate, either in a single application at the start of rotation, or fractionated as 2 applications over 2 years. Zou: To a basic fertilizer, are added 100 and 200 kg/ha of bicalcium phosphate, and 100, 200 and 400 kg/ha of natural Togo phosphate. Study of the activity and the residual activity.

Results: An equal quantity of P2O5 bicalcium phosphate is more efficient than the natural phosphate. A single application at the start of rotation is preferable to the annual fractionation (Borgou).

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0023, COMBINED EXPERIMENTS, TREATMENTS X FERTILIZATIONS, ON COTTON
A. JOLY, (DM.044.0005)

Objective: 1) Regional study of the interactions between use of fertilizers and treatments. 2) Quest for the optimum technical and economic level of intensification of fertilization and of treatments.

Approach: Different experimental techniques have been compared: factorial, split-plots, 3 levels of fertilization, 3 levels of insecticidal protection.

Results: 1) Definition of the mean optimum level of intensification per region. 2) Demonstration of a great variability in the responses. 3) Demonstration of a null, or sometimes depressant effect of copious applications of manure, irrespective of the level of insecticidal protection.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0024, INTRODUCTION OF COTTON INTO TRADITIONAL CROP ROTATIONS
A. JOLY, (DM.044.0006)

Objective: To study the introduction of cotton into the traditional crop rotations; its place in the rotation and its role in the intensification of agriculture. Economic balance of various rotations representing different levels of intensification. Mineral balance: study of losses (from the soil) and of restitutions. Approach: 3 experiments in the NW sector of Dahomey comprising 4 sowings staggered in time, and for each of them, 2 repetitions in the field - 2 or 3 rotations in comparison. Analysis of soil - investigation of mineral nutrition by foliar analysis. Study of the losses (from the soil) (orig. exportations) in mineral elements.

Results: Study of the cultural precedents for cotton. Economic interest of the intensification of methods of cultivation and of the introduction of an industrial crop. Maintenance of fertility.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0025, EXPERIMENTATION WITH VARIETIES OF COTTON
A. JOLY, (DM.044.0007)
National Network Project: See DM. 042.0005. (1.0030)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

DAHOMEY

SECTEUR IRCT SUD-DAHOMEY

Sekou, Departement de l' Atlantique, B.P. 715, Cotonou

1.0026, HERBICIDE EXPERIMENTATION ON COTTON
M. DAESCHNER, (DM.042.0001)

Objective: To test the herbicidal effect of 7 preparations in the ecological conditions of the locality in which they are used, and approach to the optimal rate of application.

Approach: 2 experiments - plots of 3 rows of 30 metres - one repetition. Each treated plot is continuous to a control untreated plot. There is thus 1 control plot after 2 treated plots. Each preparation is tested at 3 rates of application, the optimal rate D, being bordered, in this order, by rates 3/4D and 3/2D.

Results: Of interest are CGA 10832 (pre-emergence) - GS 16068 (pre-emergence), Ru 12709 (post emergence) - and Ansar 529 (post emergence).

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0027, STUDY OF THE MINERAL DEFICIENCIES OF COTTON PLANTS
M. DAESCHNER, (DM.042.0002)

Objective: 1) Diagnosis of mineral deficiencies on the regional scale and study of the response of the cotton plants to mineral fertilization; 2) Evolution of these deficiencies in the course of several rotations.

Approach: 22 Fisher block experiments with 7 materials - 6 to 8 repetitions - 4 rows per plot - 2 central ones tested - Materials for comparison: 1 - Control, 2 - NSPKBo strong dose, 3 - NSPKBo popular dose, 4 - NSPB (-K), 5 - NSKBo (-P), 6 - NPKBo (-S), 7 - SPKBo (-N). Increased insecticidal protection.

Results: - Demonstration of mineral deficiencies variable with regions: P2O5 in the North (Atacora and Borgou), K2O in the centre and south (Zou south), N and S everwhere, but less severe. Residual effect of the deficient elements on the crops following in rotation.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0028, EXPERIMENTS ON POTASSIUM FERTILIZATION OF COTTON
M. DAESCHNER, (DM.042.0003)

Objective: To determine the regions where potassium is deficient and to study the modalities for correction of this deficiency (rates of application, fractionated applications).

Approach: A) 4 different experiments: Rates of application and fractionated applications of K (Aplahoue) correction of deficiency in K (Cove) curve of activity of K; (Bohicon). B) Fisher blocks - 3 to 8 materials - 8 repetitions; C) 4 rows per plot - 2 central ones tested; D) Insecticidal protection.

Results: Demonstration of a considerable potassium deficiency in the bore (tidal wave) lands of southern Dahomey. Direct activity and residual effect of an application of K2O in correction of this deficiency.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0029, TEST ON MAINTENANCE OF THE FERTILITY OF SOILS BY PROTECTION AND RESTITUTION OF ORGANIC MATTER
M. DAESCHNER, (DM.042.0004)

Objective: Study of the role of a better protection of the soil and of restitution of the residues of harvesting in an intensive alternation of maize and cotton as a factor in maintenance of the fertility of the soil and a means of augmenting the efficacy of the fertilizer.

Approach: 2 Fisher block experiments - 6 different materials for each of the 2 experiments - 8 repetitions - 4 rows per plot - 2 central ones tested. Materials: at Bozinkpe: 2 levels of fertilization, 3 materials, application of organic matter. At Sokouhove: 2 materials: soil bare and strawed, 3 levels of nitrogenous fertilization: N - 0; N - 60; N - 120. Insecticidal protection.

Results: Evident interest of a protection of the soil, by strawing or organic restitution, in the maintenance of the fertility of soils.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0030, EXPERIMENTATION WITH VARIETIES OF COTTON
M. DAESCHNER, (DM.042.0005)

Objective: Test of behaviour of varieties selected by the I.R.C.T.; Investigation of productivity, rusticity and technological qualities.

Approach: 14 varietal experiments on 6 or 7 varieties; Fisher blocks - 3 rows per plot - central row tested - 8 repetitions; Mineral fertilization - Insecticidal protection.

Results: Proposal for the popularization of the varieties that are the best adapted regionally. According to the regions, the varieties are: BJA, HG 9, Allen 333, 444-2.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

SECTION DE RECHERCHES D'INA IRAT

Ina par N' Dali, B.P. 155, Parakou

1.0031, STUDIES ON YAMS WITH A VIEW TO THE INTEGRATION OF THIS CROP INTO AN INTENSIVE ROTATION
R. DUMONT, (DM.022.0001)

OBJECTIVE: Introduction of yams into a permanent system of cultivation.

APPROACH: Inventory of and observations on the local varieties. Cultivation techniques: factors influencing the earliness of appearance above ground, establishment of techniques likely to increase the yields. Fertilization: determination of a mineral fertilization, advantage of an organic fertilization, residual effects of fertilizations of the preceding crops.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0032, SELECTION OF A WHITE MAIZE ADAPTED TO NORTH DAHOMEY
J. LECOUTE, (DM.022.0002)

OBJECTIVE: The obtaining of a white maize well adapted to the north of Dahomey, in two forms; the one early and the other late.

APPROACH: Varietal hybridization starting with a selected yellow maize from the north of the country and a selected white maize from the south, beginning again with the progeny in the exclusively white form with maintenance established from the heterosis of the initial crossing. Divergent selection of the cumulative type with a view to the obtaining of an early form and of a late form.

RESULTS: The divergent selection for the duration of the cycle is in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0033, SUITABILITY FOR RICE OF THE SOILS OF THE MARSHY LANDS OF NORTH DAHOMEY
R. DUMONT, (DM.022.0003)
National network project - see DM.021.0001.(1.0001)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0034, SPECIFIC ROLE OF ORGANIC MATTER
R. WERTS, (DM.022.0004)
International network project - see DM.021.0002. (1.0002)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0035, ACTION OF THE TILLAGE ON THE PHYSICAL FACTORS OF FERTILITY
R. WERTS, (DM.022.0005)
International network project - see DM.021.0003. (1.0003)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0036, POTENTIALITIES OF TROPICAL SOILS
R. WERTS, (DM.022.0006)
International network project - see DM.021.0004. (1.0004)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0037, CORRECTION OF DEFICIENCIES IN P2O5
R. WERTS, (DM.022.0007)
International network project - see DM.021.0005. (1.0005)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0038, CORRECTION OF DEFICIENCIES IN K2O
R. WERTS, (DM.022.0008)
International network project - see DM.021.0006. (1.0006)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0039, MAINTENANCE OF P2O5 AND K2O FERTILITY
R. WERTS, (DM.022.0009)
International network project - see DM.021.0007. (1.0007)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0040, NITROGEN BALANCE IN TROPICAL SOILS
R. WERTS, (DM.022.0010)
International network project - see DM.021.0008. (1.0008)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0041, OBTAINMENT OF SORGHUM HYBRIDS OF AMERICANO-DAHOMEY TYPE WITH SHORT STRAW
J. LECOUTE, (DM.022.0011)

OBJECTIVE: Improvement of sorghums by reduction of the height of the stems, with translucent seeds and without a brown layer. Resistance to being beaten down and better response to fertilizers.

APPROACH: Introduction of the Combine Kafir 60 A and Hazera 610, varieties with short straw. Crossings with a local tall-stemmed sorghum. The obtaining of semi-local progeny with short straw in the form of self-fertilized lines.

RESULTS: Creation of 2 series of lines with short straw starting from each of the foreign parents, the cycle of which is analogous to that of the local sorghums. Fixation in progress. Comparative experiments still to be done.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0042, CONSTITUTION OF A COMPOSITE OF WHITE MAIZE WITH IMPROVED VARIETIES ORIGINATING IN DAHOMEY
J. LECOUTE, (DM.022.0012)

OBJECTIVE: To create a pool of maize genes to produce local pure lines that are well adapted and vigorous.

APPROACH: 2 cycles of S1 testing.

RESULTS: The obtaining of a population, to be the starting-point of future pure lines.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0043, CREATION OF A VARIETAL HYBRID OF YELLOW MAIZE ADAPTED TO THE NORTH OF DAHOMEY
J. LECOUTE, (DM.022.0013)

OBJECTIVE: Improvement of the resistance to streak, a virus disease which has recently become more severe in Dahomey.

APPROACH: Crossings with a series of introductions presenting factors of resistance to the disease.

RESULTS: Tests for intervariety hybrids made in 1971 and which will be pursued.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0044, MODALITIES OF USE OF NATURAL TOGO PHOSPHATE
R. WERTS, (DM.022.0014)
National network project - see DM.021.0009. (1.0009)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

SECTION ENTOMOLOGIE IRCT AU DAHOMEY

Sekou, Departement de l' Atlantique, B.P. 715, Cotonou

1.0045, STUDY OF THE PARASITISM OF THE COTTON PLANT
P. ATGER, (DM.046.0001)

Objective: To study locally the pressure of parasites under different conditions of phyto-sanitary protection.

Approach: Three separate rectangular plots were laid out (about 1 hectare each) with a minimum of 40 rows each 30 metres in length, forming 3 treatment replicates as follows: A-2 plots (untreated) located at opposed corners of the diagonal; B-2 plots (treated at popular rates) located at extreme opposites of the A plots; PP-2 plots treated twice weekly (super-protection) located midway and separating the juxtapositioned A-B extreme plots.

Results: The multiple observations carried out on these plots should give a better knowledge of the local parasitism, enabling correction and adaptation of the proposed schemes of treatment to popular usage.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0046, EXPERIMENTS TO CONFIRM THE EFFICACY OF INSECTICIDE PREPARATIONS IN COTTON PLAN-

DAHOMEY

TATIONS

P. ATGER, (DM.046.0002)

Objective: To obtain an additional assurance as to the efficacy of a preparation before proposing the formulation for popular use.

Approach: Four comparative experiments were conducted doing the Fisher block method, 8 component plots with 6 rows each 30 meters long , treated with the following materials in 6 replicate sprayings, starting at the 40th day: Peprothion TM (Endosulfan-DDT-Methylparathion) 300- 216-108 g./l. at 2.0 l./ha.; Azodrin plus DDT (125-250 g./l.) at 2.5 l./ha.; S 137B (DDT plus PCC-Methylparathion) 400-224-110 g./l. at 2.5 l./ha.; S 138A (phosvel) 360 g./l. at 3 l./ha.; Cela CA 6900 plus DDT (500-250 g./l.) at 1.5 plus 4 l./ha.; Endrin-DDT (120-450 g./l.) at 2 l./ha.

Result: Analysis of the health of the yield and of its weight will be the criteria of quality. The results are not yet known.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0047, TESTING OF NEW INSECTICIDE PREPARATIONS IN THE PROTECTION OF COTTON PLANTATIONS

P. ATGER, (DM.046.0003)

Objective: To discover substances highly insecticidal against one or more of the insect predators, for eventual replacement of the popularized preparations.

Approach: Five comparative experiments were conducted using the Fisher block method. Eight component plots of 6 rows, each row 30 meters long, were used with 6 sprayings per plot using the following treatments starting at the 40th day: Peprothion TM (Endosulfan-DDT- Methylparathion) (300-216-108 g/l.) at 2.0 l./ha.; Peprothion D (400- 180-100 g./l.) at 2.5 l./ha.; S 175A (Phosvel plus Zectran) 360-240 g./l.) at 2.5 l./ha.; S 176A (Phosvel plus DDT) 240-360 g./l. at 2.5 l./ha.; HOE 2960-DDT (225-450 g./l.) at 2.5 l./ha.; Endrin-DDT- Methylparathion (100-340-100 g./l.) at 2.5 l./ha.; Toxaphene-DDT- Methylparathion (200-360-112 g./l.) at 3.0 l./ha.; Azodrin-DDT-Toxaphene (150-200-200 g./l.) at 3.0 l./ha.; CRD 71-81 (DDT-PCC-Methylparathion) (450-224-110 g./l.) at 2.0 l./ha.; S2957-Toxaphene-DDT (200-250-250 g./l.) at 2.0 l./ha.

Result: Not yet analysed.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0048, RESEARCH INTO METHODS FOR THE INTEGRATED CONTROL OF COTTON PESTS IN DAHOMEY

P. ATGER, (DM.046.0004)

Objective: 1) Research on insect pathogens and entomophagous organisms in relation to the development of integrated control. 2) Determination of methods of rearing the pests Heliothis armigera and Cryptophlebia (Argyroploce) leucotreta on natural and artificial media, with the aim of multiplying viral and bacterial insect pathogens. 3) Preparation, formulation and study of the behaviour of biological products obtained after such rearing. 4) Study of the LD50s of common insecticides on populations of insects reared in the laboratory or in the field.

Approach: General observations in this area.

Progress: Rearing of Argyroploce on natural and artificial media.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0049, INSECTICIDE EVALUATION TEST IN COTTON PLANTATIONS OF MIXTURES OF PROVEN INSECTICIDAL PREPARATIONS

P. ATGER, (DM.046.0005)

Objective: To study possible synergies between insecticidal preparations as to action on a group of insects or on parasitic fauna in general.

Approach: Comparative experiments were conducted doing the Fisher block method consisting of eight component plots, each with 7 rows, each 30 meters in length. The following materials were applied in 9 sprayings, starting from the 50th day to the 129th day: Endrin-DDT (120- 450 g./l.) at 2.0 l/ha.; HOE 2960 plus Endosulfan (350 plus 350 g./l.) at 1.2 plus 1 l./ha; HOE 2960 plus DDT (350 plus 250 g./l.) at 1.5 plus 4 l./ha.; Gardona plus DDT (240 plus 250 g./l.) at 2.0 plus 4 l./ha.; Cela 6900 plus DDT (500 plus 250 g./l.) at 1.0 plus 4 l./ha.

Result: The two mixtures comprising HOE 2960, the one with endosulfan and the other with DDT added, are more efficacious (P equals 0.01) than the other preparations, judged by the following criteria: % of pods parasitized, % of blemished cotton. This is reinforced by a statistically superior production from the plots protected with these two mixtures, without there being any difference between the two.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0050, EXPERIMENT ON STARTING INSECTICIDAL TREATMENT OF THE COTTON PLANTS AT A WARNING SIGN

P. ATGER, (DM.046.0006)

Objective: To make insecticidal protection of cotton plantations more effective and less onerous.

Approach: The intensity of parasitism is estimated by the number of fallen fruit-bearing organs for an interval between rows 30 m in length. The warning is given on the basis of various levels of parasitism. Comparison of the results in 7 experiments: Fisher block method, 8 repetitions, component plots of 8 rows of 30 m; 5 materials: 1) Classical protection; 2) Protection on the basis of 1 fruit- bearing organ fallen, per 30 cm; 3) Protection on the basis of 3 fruit-bearing organs fallen, per 30 cm; 4) Protection on the basis of 6 fruit bearing organs fallen per 30 cm; 5) Protection on the basis of 9 fruit-bearing organs fallen, per 30 cm.

Results: Not yet known.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0051, INTEGRATED CONTROL OF CRYPTOPHLEBIA, BY ADDITION OF VIRUSES TO THE CHEMICAL INSECTICIDES

P. ATGER, (DM.046.0007)

As the moth Cryptophlebia Peucotreta constitutes the most formidable hazard to cotton cultivation in the South of Dahomey and is, besides, rather inaccessible to chemical insecticides, the object of this experiment is to try to complete the general action of Peprothion TM by the addition of specific entomopathogenic viruses (agents of granulosis and cytoplasmic polyhedrosis).

Approach: Larvae of C. leucotreta killed by this virus complex are added to the classical insecticide solution and the effects on production are compared. Comparative experiment: Fisher block method, 8 repetitions; plots with 10 rows of 30 m; 3 test materials: 1) Peprothion TM, alone; 2) Peprothion TM plus virus (2000 Larval Units/ha); 3) Peprothion TM plus virus (1000 Larval Units/ha).

Results: Not yet analyzed.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

SECTION FIBRES JUTIERES IRCT AU DAHOMEY

B.P. 715, Cotonou

1.0052, STUDY OF ROTATIONS OF KENAF (HIBISCUS) - MAIZE - FALLOW

R.S. COURTIAL, (DM.045.0001)

To compare a cultivation of kenaf grown uninterruptedly for 6 years, with a cultivation of kenaf interrupted for 1 or 2 years by a cultivation of maize and by 1 or 2 years of fallow.

Complex experiment: 12 repetitions.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0053, EXPERIMENTS WITH VARIETIES OF HIBISCUS, CORCHORUS AND URENA

R.S. COURTIAL, (DM.045.0002)

Determination of the available varieties of plant material that are most productive and best adapted to local climatic conditions. 5 varieties of Hibiscus cannabinus. 6 varieties of Hibiscus sabdariffa. 100 varieties in collection (Hibiscus, Corchorus, Urena). Fisher blocks - 8 repetitions. Mean yield - Varieties cannabinus 900 kg/ha, sabdariffa 1200 kg/ha.

Trials are made at the outstations of Sekou (l.135-ND), Massi (l.412-VP), and Lokpara (l.482-LF).

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0054, EXPERIMENTS ON MINERAL FERTILIZATION OF HIBISCUS SABDARIFFA

R.S. COURTIAL, (DM.045.0003)

Objective: To study the action of the elements N, S, P, K and Bo on the production of fibres; yield by the hectare, characteristics of the fibres, profitability of manuring. To determine the relative importance of each element in the fertilizing.

Approach: Experiments using the Fisher block method, 8 repetitions, 7 treatments. (without manure, complete fertilizer NSPKBo:- 43, 24, 40, 72 and 2.5 Boracine kg/ha - then: -N, -S, -P, -K, - Bo), component plots with 12 rows of 14 m; O.3 m between the rows. The 4 central rows harvested, reduced by 2 m at each end. Comparison by successive withdrawal of each element of the complete formulation. Application at sowing except for 22 units of N spread at 40 days.

Result: The elements N, S, P, K, and Bo are necessary. Deficiencies in N, K, Bo very severe, those in P and S clear-cut. Level of production relatively low: kg/ha of fibre in the plots without manure: 1600 kg/ha with the complete fertilizer. The technological information is not yet calculated. Trials are made at Sekou, Massi and Lokpara outstations.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0055, TESTS OF CHEMICAL CONTROL OF WEEDS IN KENAF CROPS

R.S. COURTIAL, (DM.045.0004)

To test commercial herbicide preparations for their efficacy in local conditions. Preparations tested: Treflan, Dacthal, Jeloman, Aresin, Gesaten, Karmex, Tok-E. Fisher blocks - 8 repetitions. For the moment Treflan is the best preparation. The economic rate of application has still to be determined. Trials at Sekou, Massi and Lokpera.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0056, STUDY OF THE ACTION OF THE ELEMENTS N, S, P, K, B, O APPLIED AS A FERTILIZER ON HIBISCUS SABDARIFFA

R.S. COURTIAL, (DM.045.0005)

Objectives: 1) To trace the curve of action of NSPK and Bo on the yield in fibre per hectare. 2) To calculate on the basis of these results the optimal rate of application of each of these elements for the yield per hectare in fibre.

Approach: An experiment using the Fisher block method and 8 repetitions, 5 treatments per element under test in 3 dosages. Test with: N, 3 rates of application : 20 -40 -60 kg/ha; S, 3 rates of application : 13 - 25 - 39 kg/ha.; P, 3 rates of application : 30 - 45 - 60 kg/ha. K, 3 rates of application : 30 - 60 - 90 kb/ha; Bo, 3 rates of application : 1 - 15 - 10 kg/ha of Boracine. Component plot, 12 rows of 14 m at an interval of O.3 m between rows. Harvesting of the 4 central rows, reduced by 2 m at each end.

Results: Pluriannual experiment: the first results are still unknown.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

1.0057, EXPERIMENT ON TECHNIQUES OF RETTING FOR HIBISCUS SABDARIFFA

R.S. COURTIAL, (DM.045.0006)

Objective: To compare 4 retting techniques for 4 forms of the plant material offered for retting, with regard to: the rapidity of the operation, the yield in dry fibres, the physical characteristics of the fibres, profitability.

Approach: 4 types of retting receptacles are prepared: natural retting places, as river inlets with running water, without management; natural retting places as ponds, with stagnant water, without management; natural, managed retting places; artificial, cemented retting places. The material for retting will be presented in the following forms: as fresh stalks, as dry stalks, as fresh thongs, and as dry thongs. Repetitions in time.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Dahomey

STATION DE RECHERCHES AGRONOMIQUES IRAT DE NIAOULI

Niaouli par Attogon

1.0058, DETERMINATION OF MINERAL DEFICIENCIES OF SOILS

A.A. GLELE, (DM.023.0001)

OBJECTIVES: To make good the mineral deficiencies of the soils before putting them under cultivation. To follow the evolution of the mineral requirements of these soils in the course of cultivation.

APPROACH: Analyses by the "flower pots" method.

RESULTS: The method is of value in respect of P2O5 and K2O. It enables forecasting of the moment when a downright deficiency in these elements will be produced in soils under cultivation.

DAHOMEY

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0059, IMPROVEMENT OF THE PROCEDURES FOR STORAGE AND CONSERVATION OF MAIZE IN A RURAL ENVIRONMENT

A.A. GLELE, (DM.023.0002)

OBJECTIVE: Increasing the value of the product and reducing losses in the course of storage.

APPROACH: 1) Study of different materials for storage space (husbandry cribs or bins, traditional granaries, jars, sacks, silos of metal, concrete, etc.) from the point of view of efficacy, and cost price. 2) Study of the authorized insecticide preparations which ensure good conservation.

RESULTS: 1) Superiority of conservation of dry grain in hermetically sealed receptacles with or without insecticide treatment (dusting or gas). 2) Necessity for protecting the walls of masonry silos against humidity.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0060, PRODUCTION OF DOUBLE CRYPTO-HYBRIDS BETWEEN LOCAL IMPROVED WHITE MAIZE AND AN INTRODUCED MEXICAN VARIETY FROM TUXPENO STOCK

J. LECOUTE, (DM.023.0003)

OBJECTIVE: To obtain hybrids having the structure of double hybrids, with a view to rapid use.

APPROACH: Self-fertilization in Tuxpeno (Mexico). The S1 lines are each crossed with 1 plant of the local variety which is itself self- fertilized and which serves as male parent.

RESULT: The self-fertilizations are done in Tuxpeno. The S1 lines have been sown.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0061, CONSTITUTION OF A VARIETAL COMPOSITE OF MAIZE FROM INTRODUCED FOREIGN VARIETIES

J. LECOUTE, (DM.023.0004)

OBJECTIVE: To offer a late white and yellow maize.

APPROACH: 22 well-adapted entries from the collection. Constitution of the composite by repeated polycrossing and choice of plants from the castrated lines. Three S1 tests in succession.

RESULTS: Composite obtained. Start made on internal improvement of the composite by tests on the S1 generation.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0062, THE OBTAINING OF PURE LINES FROM FOUR LOCAL POPULATIONS OF WHITE MAIZE

J. LECOUTE, (DM.023.0005)

OBJECTIVE: The obtaining of hybrids of white maize.

APPROACH: Research work and the obtaining of varieties resistant to disease and to being beaten down.

RESULTS: The obtaining of 400 fixed lines resistant to being beaten down and to diseases.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0063, FABRICATION OF STERILE-MALE STRAINS OF MAIZE ADAPTED TO DAHOMEY

J. LECOUTE, (DM.023.0006)

OBJECTIVE: To facilitate the production of hybrid seeds.

APPROACH: Introduction of foreign sterile-male strains. Crossing with local or foreign varieties.

RESULTS: Two sterile-male strains have shown good adaptation to Dahomey.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0064, INTRODUCTIONS AND TESTED COLLECTIONS OF FOREIGN VARIETIES OF MAIZE

J. LECOUTE, (DM.023.0007)

OBJECTIVE: Creation of quality hybrids having a high yield.

APPROACH: To have good testers for the local varieties. Research for the following characters: Resistance to being beaten down, short stems, resistance to diseases.

RESULTS: Demonstration of four good testers with the local varieties and lines.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0065, PRODUCTION OF A COMPOSITE OF YELLOW MAIZE FROM INTRODUCTIONS FROM ABROAD

J. LECOUTE, (DM.023.0008)

OBJECTIVE: Creation of a yellow composite complementary to the local yellow variety already improved and extracted from the Agbo coastal maize population.

APPROACH: Introduction of 30 foreign varieties. Selection of 15 varieties after the preliminary tests against "Agbo". Yellow composite created, starting from these 15 varieties. Reciprocal recurrent selection between the introduced composite and the local yellow variety.

RESULT: At present 15 entries have been chosen out of the 30 which have been tested.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0066, CORRECTION OF DEFICIENCIES IN P2O5

R. WERTS, (DM.023.0009)

International network project - see DM.021.0005. (1.0005)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0067, CORRECTION OF DEFICIENCIES IN K2O

R. WERTS, (DM.023.0010)

International network project - see DM.021.0006. (1.0006)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0068, MAINTENANCE OF P2O5 AND K2O FERTILITY

R. WERTS, (DM.023.0011)

International network project - see DM.021.0007. (1.0007)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

1.0069, INTRODUCTION OF FOREIGN VARIETIES OF MANIOC

R. WERTS, (DM.023.0012)

OBJECTIVE: Adaptation of varieties having a high percentage of starch, resistant to mosaic disease in the conditions of South Dahomey.

APPROACH: Introduction, collection, comparative experiments.

RESULTS: Production obviously inferior to that of the country of origin. Non-resistance to mosaic of the varieties said to be resistant. Decline in the level of starch.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Dahomey

STATION IFAC D'ALLAHE

B.P. 89, Abomey

1.0070, ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE

G. MONTAGUT, (DM.141.0001)

Network project - see DM.140.0001. (1.0011)

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Dahomey

STATION IFAC DE TOUE

B.P. 89, Abomey

1.0071, ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE

G. MONTAGUT, (DM.142.0001)

Network project - see DM.140.0001. (1.0011)

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Dahomey

STATION IRHO DE SEME-PODJI

Seme - Podji via Porto - Novo

1.0072, MINERAL NUTRITION OF HYBRID COCONUT PALMS

M.H. TCHIBOZO, (DM.062.0001)

Objective: To establish a mineral fertilization adapted to the hybrid material, generally much more productive than the Large Local (Grand Local) variety.

Approach: Factorial experiment of 4 times 4 times 2 design, studying N, K, Mg. The phosphate fertilization is studied by subdivision.

Results: The necessity for applying N and K has already been demonstrated on the large local coconut palm. The experiment on hybrids has been set up in 1972, no results to date.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

1.0073, INFLUENCE OF IRRIGATION ON THE PRODUCTION OF THE HYBRID DWARF CROSSED WITH LARGE COCONUT PALMS

M.H. TCHIBOZO, (DM.062.0002)

Objective: To study the economic balance of the irrigation of hybrid coconut palms in Dahomey.

Approach: Practice of irrigation from a well-point which takes up water directly from the ground water-table. This technique has been established for the irrigation of the seedling fields.

Observations on growth, then observations of the production of hybrids with and without irrigation.

Results: Irrigation has a spectacular effect on growth. The results obtained to date on Dwarfs are remarkable, but cannot be generalized for the hybrids of Dwarfs.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

1.0074, EXPERIMENT ON CHEMICAL CONTROL OF ACERIA GUERRERONIS KEIFER (PARASITE OF THE COCONUT PALM)

M.H. TCHIBOZO, (DM.062.0003)

Objective: Evaluation of the losses (in copra/hectare) caused by this acarid. Reduction of these losses by chemical treatment.

Approach: Study of the activity of a large number of special preparations. Activity of the different concentrations - frequencies of the treatments.

Results: The losses are of the order of 8 to 10 percent. Two proprietary commercial preparations, Nuvacron and Merestan have a very good efficacy against Aceria. The studies are being continued to define the optimal dosage and the best adapted frequencies. An estimate of the profitability will be drawn up.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

STATION PRINCIPALE IRHO DE POBE

Pobe

1.0075, STUDY OF THE NUTRITION, IN WATER, OF THE OIL PALM

M. OLLAGNIER, (DM.061.0001)

Objective: To determine the techniques of cultivation that will enable a better nutrition in water during the dry period. To study irrigation in a palm plantation.

Approach: Methods of cultivation. Comparison of bare soil, strawing, leguminous (plant cover) regrowth, Brachiaria, and of the effect of castration on 6 experiments. An experiment with slow irrigation. Observations: measurements on the young plants; foliar diagnosis - recording of the yields - measurements of the opening of the pores.

Results: The requirements in water of the palm are close on 5 mm/day. In the conditions of severe moisture deficit in Dahomey: the bare soil with castration enables more rapid growth of the young plant and allows the young tree to be brought into production a year earlier. The potassium nutrition is better on bare soil, this being correlated with a better uptake of moisture. The studies on the effect of the plant cover and of the bare soil are being pursued. The slow irrigation is in the course of being applied.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

1.0076, REGENERATION OF THE SOILS AND FERTILIZATION IN REPLANTATION

R.O. OCHS, (DM.061.0002)

Objective: To improve the organic level, the structure of the soil, the mineral nutrition, and to observe the factors positively influencing nutrition and yields of crops.

Approach: Regeneration experiments: by different cultivated plants: Pueraria javanica, Pennisetum purpureum, Stylosanthes gracilis - Brachiaria ruziziensis (ploughed in or left growing); or forage plants: Brachiaria - Stylosanthes (grazed as pastures or not grazed). Experiments on types of fertilization: inspection of state of nutrition by foliar diagnosis, measurements and inspection of the yields.

First Results: No conclusions on the interest of regeneration (experiment too recent). Pennisetum purpureum and Stylosanthes without any results of immediate interest. The nitrogenous fertil-

izer treatments have a favourable effect on the development of young plants, without repercussion on production. Positive effect of applications of K on the (K) content (of the plants) and very favourable effect on production.

High rates of application are of no advantage. K limits the adsorption of Mg.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

1.0077, STUDY OF THE INFLUENCE OF THE ANIONS SO4 AND CL

M. OLLAGNIER, (DM.061.0003)

Objective: Study of the assimilation of potassium according to the potassic fertilizer employed and the contents of SO4 and of Cl in the soils.

Approach: 2 experiments planted up on two plantation cooperatives, comparing applications of potassium chloride or of potassium sulphate on bare soil and on soil under a covering. Inspection of nutrition by foliar diagnosis. Measurement of growth, then inspection of production.

Results: The potassium sulphate fertilizer involves a decrease in the chloride content of the foliar tissue. Up to now, the growth measurements have not given any significant differences between the two treatments.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

1.0078, FERTILIZATION OF THE OIL PALM IN FERRALYTIC SOILS ON "CONTINENTAL TERMINAL" SOILS ("TERRES DE BARRE")

M. OLLAGNIER, (DM.061.0004)

Objective: To study the reactions of the oil palm tree to the applications of fertilizer as single and combined applications. To determine the interactions between elements and forms of application, the equilibriums of fertilization and the economical rates of application. Effects of the fractionation of applications.

Approach: 12 experiments and field trials. Observations made: measurements of growth of young plants, foliar diagnosis, productions (number of racemes and their mean weight).

Results: Provisional: Nitrogen is of value to growth of the young plant. Interaction on assimilation of phosphorus - Null or depressive effect on yield. Potassium: raising of the contents. Favourable effects of medium rates of application upon development. Distinct antagonism of K on the absorption of Mg. The absorption of N and of P and particularly that of K is related to the (recorded) rainfall (and to the useful sunlight). In the conditions of Dahomey, high rates of application of K have not been evaluated. The study is being continued, in particular on the form of potassic fertilization.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

1.0079, STUDY OF THE RESISTANCE TO DROUGHT OF THE OIL PALM

M. OLLAGNIER, (DM.061.0005)

Objective: To gain better knowledge of the characters of resistance or adaptation to drought of the oil palm tree and to select lines adapted to the zones with a severe moisture deficit.

Approach: The studies carried out are of three orders: 1) Field observations - Morphological, anatomical and physiological characters in relation to behaviour. They allow, in accordance with criteria of damage, a choice of planting material having distinct behaviour. 2) Establishment of tests for resistance to drought: Osmotic tests for germination - tests of root suction - of liberation of catalase or of proline - of heat resistance - of stability of chlorophyll. Tests on adult trees. 3) Application of the tests for the selection of resistant crossings.

Results: Elimination of the osmotic test for germination; continuance of the test of root suction on crossings of known behaviour. The test of heat resistance on crossings descended from planted lines gives results in agreement with the classification of these lines by origin. The test of liberation of catalase has been demonstrated on foliar tissue placed in conditions of drought.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

GAMBIA

YUNDUM EXPERIMENTAL STATION

P.O. Box, Bathurst

2.0001, IMPROVEMENT OF SORGHUM, MILLET AND MAIZE PRODUCTION

I.R. HANCOCK, (GA.024.0001)

Objective: To increase yields whilst maintaining adaptability and grain quality: selection for early maturity.

Approach: Chiefly through selection of local and introduced varieties, fertilizers and relevant cultural methods (e.g. spacing).

Progress: Some introduced cultivars ripening in the rains are unadapted but a few are very promising. An NP fertilizer compound (low rate of application) and farmyard manure tentatively recommended pending further fertilizer tests.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0002, COTTON IMPROVEMENT

I.R. HANCOCK, (GA.024.0002)

Objective: To raise the productivity and quality of cotton.

Approach: Introduction and evaluation of varieties, insecticidal fertilizer and cultural trials with statistically designed experiments at Yundum and simple verification trials in main cotton areas 250 miles eastward.

Progress: Variety Allen 333 - 57 successfully grown commercially, and seen to be replaced by BJA 592; spraying of D.D.T. and Carbaryl has given a good degree of pest control; lint quality acceptable for export.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0003, POTATO (SOLANUM TUBEROSUM) BREEDING PROJECT

T.H. BANNISTER, (GA.024.0003)

Objective: To isolate from true seedlings, types of Irish potatoes best suited to local conditions.

Approach: The seedlings will be field-planted and screened for general adaptability and yield potential to select eventually the best clone(s).

Progress: The project is in its first year.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0004, ONION IMPROVEMENT

T.H. BANNISTER, (GA.024.0004)

Objective: To select high yielding short day onion varieties with good storage quality.

Approach: Selection within introduced varieties under optimum cultural conditions; storage tests. Fertilizer trials planned.

Progress: From 17 varieties, the following have been provisionally selected: Texas Grano (poor storage quality), Bombay Red, Tropicana (medium keepers) Golden Creole and Red Creole (low yielders but good keepers).

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0005, GROUNDNUT IMPROVEMENT PROGRAMME

I.R. HANCOCK, (GA.024.0005)

Objective: To improve the yield and quality of groundnuts.

Approach: Variety trials (local and exotic CV.), fertilizer and cultural trials with simple experiments on farmers' fields.

Progress: An introduced variety selected, cultural methods recommended, seed multiplied for distribution. Single superphosphate and seed dressing recommended. Emphasis is now on collecting and testing oil-type and confectionary cultivars, variety/fertilizer trials (including micronutrients), selecting for rosette resistance.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0006, VEGETABLE VARIETY TRIALS FOR CANNING OR BLAST FREEZING

T.H. BANNISTER, (GA.024.0006)

Objective: Selection of high yielding tomato, French beans, and carrot varieties suitable for canning or freezing, to reduce imports and meet local demand from July - December when fresh temperate vegetables are not readily grown due to climatic factors.

Approach: Initially, evaluation of varieties and freezing or canning tests, followed by spacing and fertilizer trials.

Progress: In 1971/72 small samples of French beans and carrots were successfully blast frozen. Tomato canning tests in 1973 are planned. Nematode infestation would be a serious problem with tomato growing-resistant varieties and rotations would suppress serious build- ups.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0007, A STUDY OF THE ECOLOGY, BIOLOGY, & CONTROL OF THE GROUNDNUT SEED BEETLE

J.A. CONWAY, (GA.024.0007)

Objective: Control of the groundnut seed beetle (Caryedon serratus (Ol.).

Approach: Evaluation of existing chemical control techniques as recommended by Department for seed and trade storage. Comparison of alternative control techniques and materials. Study of the origin, extent and development of infestation in seed and trade

storage. Identification of primary host species in Gambian flora and determination of infestation sequence relative to the groundnut harvest.

Progress: Existing recommendations found wanting, new techniques and materials suggested. New biological information changes emphasis of control methods. Primary host work indicates possibility of biological rather than chemical approach.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

2.0008, CITRUS ROOTSTOCK TRIAL

T.H. BANNISTER, (GA.024.0008)

Objective: To select the most suitable rootstock(s) for citrus with resistance to tristeza and gummosis.

Approach: Seed of virus free rootstocks imported and onto them will be budded orange scions from selected trees.

Progress: Rootstock seeds only recently sown.

SUPPORTED BY Ministry of Agr. & Nat. Resources - Gambia

GHANA

ACCRA VETERINARY LABORATORY

P.O. Box M161, Accra

3.0001, POULTRY DISEASE INVESTIGATION

J.D. CORKISH, (GH.211.0001)

Objective: Diagnosis of poultry diseases.

Approach: Examination of post mortem material using bacteriological, serological, histological and parasitological aids where necessary. Field visits and examination of clinical cases where necessary.

Progress: Majority of poultry diseases stem from inadequate attention to husbandry and feed deficiencies.

SUPPORTED BY Ministry of Agr. - Accra, Ghana

AGRICULTURAL RESEARCH STATION KPONG

P.O. Box 9, Kpong

3.0002, INTRODUCTION AND SELECTION OF NEW RICE VARIETIES

A.N. ARYEETEY, (GH.324.0001)

OBJECTIVE: To identify improved rice varieties suitable for mechanised production under irrigated and upland conditions and to supply pure seed of the best (recommended) varieties to the Seed Multiplication Unit of the Ministry of Agriculture and farmers.

APPROACH: Improved rice varieties are obtained from other countries (mainly tropical) and their performance evaluated in observation plots and replicated variety trials at Kpong Station. With the co-operation of the Ministry of Agriculture, promising varieties from the trials are tested further in the various rice growing districts. Based on the performance of the varieties in the district trials, the best are then recommended for production by farmers.

PROGRESS: Among varieties which have been recommended under this project and are being grown by farmers are: (1) SML Alupi, SML Tapuripa, IR 5 and IR 20 - for production under irrigation and in valleys which get flooded during the rainy season. (2) Palawan, IR 5 and IR 20- for upland conditions in northern Ghana.

SUPPORTED BY University of Ghana - Accra

3.0003, FERTILISER REQUIREMENTS OF IRRIGATED RICE ON THE BLACK SOILS, ACCRA PLAINS

E.J. KHAN, (GH.324.0002)

OBJECTIVE: Recommendations for efficient use of fertilisers in irrigated rice on the black soils of the Accra Plains.

APPROACH: Statistically designed field experiments, direct seeded rice, supporting laboratory studies as desirable.

PROGRESS: After 7 years of continuous studies, 2 crops each year, the following results have been obtained: 1. In combination with P at a rate of 23 kg P/ha. there has been a linear response to N in the form of ammonium sulphate under annual double-cropping continuously. 2. There is no response to K fertilisers. 3. There is no significant difference among sources of N in the form of sulphate of ammonia, urea, and di- ammonium phosphate. 4. Split application of N, half at planting and half at booting has given significantly increased yields. 5. Sulphur- coated urea is now under trial, and studies with zinc and iron will be started in 1973.

SUPPORTED BY University of Ghana - Accra

3.0004, CONTROL OF WEEDS IN RICE

A.N. ARYEETEY, (GH.324.0003)

OBJECTIVE: To find effective herbicides for use in controlling weeds in irrigated and upland rice.

APPROACH: Samples of herbicides are obtained from manufacturers, their agents and from rice research organizations (eg IRRI). Trials are conducted with different rates of the herbicides to determine: (1) Effectiveness in weed control. (2) Harmful effects on rice plants.

PROGRESS: Mixtures of propanil and Machete (CP 53619), applied as a post-emergence treatment, have consistently given good weed control under both upland and irrigated conditions. Propanil, applied alone has been effective under irrigated conditions but unsatisfactory in upland rice. Fluorodifen (Preforan) has given good results in upland rice.

SUPPORTED BY University of Ghana - Accra

3.0005, COTTON AGRONOMY ON THE BLACK SOILS, ACCRA PLAINS

E.J. KHAN, (GH.324.0004)

OBJECTIVES: Recommendations on best variety, best planting date, fertiliser practice, water requirements, weed control, insect control, spacing.

APPROACH: Statistically designed field experiments, supporting foliage and soil analyses.

PROGRESS: 1. Ten varieties are being finally tested from an original number of 28. 2. The highest yields are obtained when cotton is planted between the last week of July and the first week of August at Kpong, but irrigation is necessary. 3. Highest yields have been obtained with NPK fertilisers at 40, 50 and 30 kg/ha.,

but as N seems to be the most important, further investigations are in progress. There is no difference between sulphate of ammonia, urea and di-ammonium phosphate as sources of N. 4. Highest yields have been obtained by maintaining the soil moisture regime at 35% available moisture. 5. No single herbicide has given significantly better yields than handweeding, but a mixture of cotoran and preforan, and CP 53619 alone have given as good results as handweeding. 6. Endrin/DDT, Sevin/DDT, Toxaphene/DDT mixtures gave best results in insect control. 7. Spacing results will be available by year-end.

SUPPORTED BY University of Ghana - Accra

3.0006, SUGARCANE AGRONOMY ON THE BLACK SOILS OF THE ACCRA PLAINS
Y. TWENEBOAH, (GH.324.0005)

OBJECTIVES: Recommendations on best short duration, mid-season, and late duration varieties, fertiliser requirements, weed control, spacing and planting material, seed treatment.

APPROACH: Statistically designed field experiments, soil and plant analyses, juice analyses.

PROGRESS: 1. Best yielding varieties - CP 48-103, NCo 10 (short duration); PR 980 and CO 453 (mid-season); CO 419, Co 349 and B 41227 (late varieties). 2. No significant difference between sulphate of ammonia and urea as N source; split application of N (half at planting, and half at earthing-up) recommended. N,P,K application at 100 kg N, 50 kg P and 80 kg K/ha recommended. 3. Bladex, Simazine alone and Simazine plus Lasso have given best weed control. 4. Planting ridges 0.9 m apart are better 1.2 m or 1.5 m apart. Sett planting has not proven superior to whole stalk planting. Sett treatment has not proven superior to untreated setts at this stage.

SUPPORTED BY University of Ghana - Accra

3.0007, VARIETAL IMPROVEMENT OF COWPEA
A.N. ARYEETEY, (GH.324.0006)

OBJECTIVE: To obtain high yielding, even-maturing and disease- resistant varieties of cowpea.

APPROACH: The following methods are being used: 1) Trial of promising varieties from the variety collection. This collection has been obtained from both local and foreign sources. 2. Breeding (by hybridisation and selection) to evolve new varieties. Genetic studies of agronomic characters are made, if such studies are necessary for the attainment of particular breeding objectives.

PROGRESS: Some varieties (from the variety collection) have given high yields of over 1,700 kg/ha in the variety trials. One of the high yielding varieties, Caroni, has been given yields of 800 to over 1000 kg/ha of dry grain in large scale plantings, and seed of this variety has been distributed to farmers.

The inheritance of grain yield components and their correlation with yield has been studied.

SUPPORTED BY University of Ghana - Accra

3.0008, WEED CONTROL IN COWPEA
A.N. ARYEETEY, (GH.324.0007)

OBJECTIVE: To find effective herbicides for use in controlling weeds in cowpea.

APPROACH: Samples of herbicides are obtained from manufacturers and their agents and tested to determine: 1) Effectiveness in weed control. 2) Harmful effects on cowpea plants.

PROGRESS: Only a limited range of herbicides have been tested, and of these trifluralin (1 kg/ha), fluorodifen (3-4 kg/ha) and 17623 RP (0.75 kg/ha) were the most promising.

SUPPORTED BY University of Ghana - Accra

3.0009, TRIALS WITH NEW CROPS
A.N. ARYEETEY, (GH.324.0008)

OBJECTIVE: To determine whether satisfactory yields of sorghum, sesame and wheat can be obtained on the Tropical Black Soils (Akuse Series) of Kpong Station. These crops have either not been tried at Kpong or the results of earlier trials were inconclusive.

APPROACH: A number of introduced varieties of each crop was obtained and tested in variety trials to determine the yield levels of the different crops.

PROGRESS: The highest yields obtained for the various crops were: sorghum - 3900 kg/ha., soya bean 2300 kg/ha., sesame - 1300 kg/ha., wheat 1500 kg/ha. Trials with sesame and wheat have been suspended to enable the research personnel to devote more time to work on sorghum and soya bean which look more promising.

SUPPORTED BY University of Ghana - Accra

3.0010, CROSSBREEDING FOR BEEF
L.O. NGERE, (GH.324.0009)

OBJECTIVE: Beef cattle production.

APPROACH: Crossing the West African Shorthorn and Ndama cattle which have high resistance to trypanosomiasis and are slow in maturing with quicker maturing cattle from abroad, viz. the Santa Gertrudis and Red Poll, by artificial insemination.

PROGRESS: A number of crossbred calves are already available for further studies.

SUPPORTED BY University of Ghana - Accra

AGRICULTURAL RESEARCH STATION NUNGUA

P.O. Box 38, Legon

3.0011, DAIRY CROSSBREEDING IN CATTLE
D.M. BAFIYEBOA, (GH.326.0001)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0012, CAUSES OF MASTITIS IN DAIRY CATTLE AT AGRICULTURAL RESEARCH STATION
D.M. BAFIYEBOA, (GH.326.0002)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0013, STUDY OF SYSTEMS OF MANAGEMENT OF POULTRY INCLUDING DUCKS AND TURKEYS
D.M. BAFIYEBOA, (GH.326.0003)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0014, RATE OF GAIN OF CROSSBREED CATTLE ON NATIVE PASTURE AND SUPPLEMENTED FEED

D.M. BAFIYEBOA, (GH.326.0004)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0015, NUTRITIONAL STUDIES WITH PIGS USING DIETS CONTAINING MAINLY LOCALLY PRODUCED FEED STUFFS

D.M. BAFIYEBOA, (GH.326.0005)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0016, THE PRODUCTIVITY OF IRRIGATED PASTURES

D.M. BAFIYEBOA, (GH.326.0006)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0017, CONTROL OF SKIN DISEASES OF FARM ANIMALS

D.M. BAFIYEBOA, (GH.326.0007)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0018, PRODUCTION OF SORGHUM AS A GRAIN AND FODDER CROP FOR LIVESTOCK

D.M. BAFIYEBOA, (GH.326.0008)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0019, STUDIES WITH THE SMALL RUMINANTS

D.M. BAFIYEBOA, (GH.326.0009)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0020, FIELD TRIALS OF SOYA BEAN PRODUCTION

UNKNOWN, (GH.326.0010)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

3.0021, TILLAGE SYSTEMS FOR TROPICAL AGRICULTURE

UNKNOWN, (GH.326.0011)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY University of Ghana - Accra

ANIMAL RESEARCH INSTITUTE

P.O. Box 20, Achimota

3.0022, GRASS AND LEGUME SEED - IMPROVEMENT AND MULTIPLICATION

A. TETTEH, (GH.020.0001)

Objective: To select high seed-producing lines of species for bulking into synthetic varieties and multiplying seeds of higher producing varieties to make improved seeds available to farmers.

Approach: (a) Selection of ecotypes, (b) Selfing (where necessary), (c) Polycross, (d) Assessment of lines, (e) Bulking of superior lines, (f) Synthetics.

Progress: (a) The synthetic seed production of Andropogon gayanus has reached the Polycross stage this year (1973); (b) Exotic varieties of Centrosema pubescens have been multiplied under supervision for seed production (Foundation Seeds); (c) Open-pollinated varieties of the following local grass species have been isolated: (1) Andropogon gayanus, Kunth, (2) Panicum maximum, Jacq., (3) Setaria sphacelata; (d) Digitaria decumbens, Stent. has been multiplied from introduced variety for distribution to farmers.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0023, NUTRITIVE VALUE OF DIGITARIA DECUMBENS AND CYNODON PLECTOSTACHYUS IN ADMIXTURE WITH CENTROSEMA PUBESCENS

M.K. ANTWI, (GH.020.0002)

Objective: The fundamental objective is to gather information on the feeding value of the pasture species concerned and the possible application of the results to animal production programmes.

Approach: The project layout is a randomised block design of four treatments per block and each treatment (on one acre plot) is replicated four times. Measurements will include: (1) Herbage dry matter and production and botanical composition; (2) Proximate analysis; (3) Herbage dry matter/organic matter intake; (4) Herbage dry matter/organic matter digestibility; (5) Efficiency of utilization liveweight responses and other productive characteristics.

Progress: Preliminary field work is completed. Pastures are now established and fenced in. Grazing and pasture sampling for the parameters above will commence in April/May, 1973.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0024, IMMUNE RESPONSE TO NEWCASTLE DISEASE VACCINES

B.L. NUTOR, (GH.020.0003)

Objective: Evaluation of Newcastle disease vaccines.

Approach: Chickens were vaccinated as recommended by the Division of Veterinary Services (i.e. at the ages of 1, 4, and 16 weeks). Haemagglutination inhibition test was used to determine the antibody response to the vaccinations.

Results: High material antibody in the 7 day-old chicks inhibited immune response. Revaccination at the age of 4 weeks resulted in secondary antibody response but this was short-lived. Revaccination at the age of 16 weeks resulted in high antibody response which persisted for a long time.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0025, PRODUCTIVITY OF GRASS/LEGUME PASTURES AGAINST PURE STANDS OF GRASSES AND LEGUMES

GHANA

A. TETTEH, (GH.020.0004)

Objective: To isolate suitable and productive grass/legume pasture to support a viable livestock production.

Approach: Field plot technique of randomization and statistical analysis of the results.

Progress: Some grass/legume mixtures were higher yielding in dry matter than the pure stands of either the grass or the legume. Specifically these were Andropogon/Centrosema, Digitaria/Centrosema. Work on this is still in progress.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0026, DRY MATTER YIELD ASSESSMENT OF LOCAL AND EXOTIC GRASS SPECIES

A. TETTEH, (GH.020.0005)

Objective: To investigate the relative dry matter productivity of native and local grasses under collection with a view to studying the carrying capacity of the grasses in relation to livestock production.

Approach: Field plot techniques of randomization and statistical analysis of the results.

Progress: The local species proved much more productive than the exotic species compared to them. Work is still progressing on this project.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0027, HUMIDITY STUDIES ON HARD TICKS

V. AMMAHATTOH, (GH.020.0006)

The investigation into the effect of different relative humidities on the hatchability of the eggs of gravid females of cattle ticks, especially females of Amblyomma variegatum (Fab, 1794) at a constant temperature of 30 degrees C was carried out in order to find out the conditions which favour hatching of the ixodid eggs.

Several batches (each consisting of 50 eggs) were subjected to the following relative humidities, namely, 35 percent, 40 percent, 45 percent and 50 percent respectively, at a constant temperature of 30 degrees C, for 3 months. After this period of treatment the eggs did not hatch. They were then transferred to 100 percent RH and kept again at 30 degrees C for another period of 3 months. The eggs still failed to hatch. It appeared therefore that the power of hatchability of the eggs of the ixodid female tick, as exemplified by Amblyomma variegatum, was permanently destroyed in 84 days after continuous treatment with 35 percent, 40 percent, 45 percent and 50 percent relative humidities at a constant temperature of 30 degrees C.

Collections of adult ticks were made once weekly from local breeds of cattle consisting of West Africa Shorthorn, White fulani, Sanga- Sokoto and N'dama. The cattle belonged to private cattle farmers, and they were herded in native kraals on the Accra Plains (Burma Camp, Frafraha and Lashibi).

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0028, TICK SURVEY ON SELECTED AREAS ON THE ACCRA PLAINS

V. AMMAHATTOH, (GH.020.0007)

Collections of adult ticks were made once weekly from local breeds of cattle consisting of West Africa Shorthorn, White Fulani, Sanga- Sokoto and N'dama. The cattle belonged to private cattle farmers, and they were herded in native kraals on the Accra Plains (Burma Camp, Frafraha and Lashibi).

The aim of the survey was to determine the presence and incidence of the tick species occurring on the cattle herded in the areas selected.

Detailed analysis of the results is in progress. But a quick examination of the data has confirmed the presence of the following tick species on cattle, namely Amblyomma variegatum, Hyalomma marginatum rufipes and Boophilus decoloratus. Amblyomma variegatum appeared to be the commonest and most abundant, followed by Hyalomma marginatum rufipes and then Boophilus decoloratus.

There was a trend which seemed to suggest that the average numbers of Amblyomma variegatum was highest during the traditional wet season. The reverse was observed in the case of H. marginatum rufipes.

At all the three study areas there was a higher proportion of male ticks than females of both A. variegatum and Hyalomma marginatum rufipes. In the case of Boophilus decoloratus, because the male tick is very small in size and could not be easily seen without careful searching, attention was focussed on the larger adult female ticks during the quick sampling operations.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0029, HELMINTH PARASITES OF PIGS IN GHANA

D. SAPONG, (GH.020.0008)

Objective: to map out the helminth parasites of pigs in Ghana (so that anybody rearing pigs in any part of the country can know which parasites are likely to infect the animals and take the appropriate precautionary measures).

Method: the various organs of pigs slaughtered at the Accra slaughter house have been thoroughly examined for worms. The areas where the pigs came from and the worms found in them have been recorded. This work will be extended by visiting the regions and examining pigs for worms. It is hoped that by the end of the work, the distribution pattern of the worms will have been made.

Progress: From the survey carried out at the Accra slaughter house the following worms have been found: A) Cestoda: Cysticercus cellulosae: in the muscles of body - cheek, tongue, rib, heart, diaphragm and thigh. B) Nematoda: Ascaris Lumbricoides - in the small intestine; Oesophagustomum dentatum - in the large intestine and caecum, Globocephalus spp. - in the small intestine; Metastongylus spp. - in the lungs; Stephanurus dentatus - in the kidneys; Ascarops stronglyina - in the stomach; Gnathostoma spp. - in the stomach; Thysocephalus sexalatus - in the stomach and small intestine; Trichuris suis - in the caecum.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0030, THE EFFECT OF LEVEL OF WHEAT BRAN ON NUTRIENT METABOLISM BY PIGS

D.O. ANDAH, (GH.020.0009)

Objective: Assessment of the extent to which the level of local wheat bran (wheaten and wheat bran) in the diet affects the digestibility of other nutrients in the diet.

Approach: Randomized block design with 6 treatments (0, 10, 20, 30, 40 and 50 percent wheat bran in diets). Chemical analysis on samples of total faecal collections.

Progress: Analyses of collection from two completed replicates are very inconsistant. The project has been suspended temporarily due to local shortage of fish meal.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0031, THE COMPARATIVE PERFORMANCE OF PIGS FED DIETS CONTAINING DIFFERENT LEVELS OF WHEAT BRAN

D.O. ANDAH, (GH.020.0010)

Objective: Effect of feeds containing different levels of local wheat bran (wheaten and wheat bran) on live weight performance and carcass quality of porkers.

Approach: 6 times 2 factorial design (6 levels of wheat bran and two sexes). Individual feeding of pigs.

Progress: Only the first two replicates were completed before fish meal shortage occured. Data from these two replicates indicate absence of treatment effect on parameters. The project will be continued when fish meal becomes available.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0032, STUDIES ON IRON SUPPLEMENT FOR PIGLETS

D.O. ANDAH, (GH.020.0011)

Objective: Development of fortified laterite as a suitable iron supply for piglets.

Approach: 2 times 3 factorial (2 levels of vitamin; no iron administration, Fedextran injection and Laterite) parameters:- Hb and growth rate.

Progress: There is indication that at 6 weeks, treatment has no effect on Hb levels, also growth rate was lowest for the control and greatest for the vitamin fortified laterite.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0033, LOCAL LEAFMEAL AS SOURCES OF EGG YOLK COLOUR

E.W. AGUDU, (GH.020.0012)

Egg yolk colour is becoming a quality factor in Ghana. The main source of the yolk colour in Ghana are yellow corn, alfalfa meal and synthetic xanthophylls. Yellow corn is generally scarce; importation of alfalfa and synthetic xanthophyll materials often bring the problem of foreign exchange, and keeping quality of the materials due to long transportation periods.

The investigations will be useful in cutting down the importation of at least alfalfa meal.

The local leaves will be picked, dried artificially to about 40 degrees C. The meal produced will be fed for about 33 weeks to laying hens. Colour of the yolk of the eggs obtained will be assessed visually by standard visual techniques.

Total and pigmenting xanthophyll content of cassava (manihot utilissium) and Madras Thorn (Pithecellobium dulce) have been determined. Feeding trials show that up to 5 percent of these leafmeals can be incorporated with layer diets for good yolk colour. The leafmeals are also better sources of xanthophyll than some samples of imported alfalfa meal and synthetic xanthophyll.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0034, LOCAL FEED INGREDIENTS IN POULTRY RATIONS

E.W. AGUDU, (GH.020.0013)

Both imported mash and high protein concentrate are very popular in Ghana. Only a few farmers depend on locally compounded poultry diets. These imported diets might deteriorate in quality before reaching Ghana.

Two types of commercial diets are tested with locally compounded diet, using day old chicks in a randomized experiment. Growth rate, feed-gain and mortality are recorded at 4 and 8 weeks.

At both 4 and 8 weeks, chicks fed on the locally compounded diet gained highest weight and converted feed most efficiently. The lowest results were obtained from chicks on imported complete mash while the high-protein concentrate mixed with local corn gave results between the other two diets.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0035, FERMACTO 500 SUPPLEMENTATION TO LAYER DIETS

E.W. AGUDU, (GH.020.0014)

Fermacto 500, an unidentified growth factor (UGF) source, is a new product yet to be introduced into Ghana. Other such products are imported, some of which have no effect on production.

The economic value of Fermacto 500 will therefore be assessed in poultry feed in Ghana.

A control diet, Fermacto 500 at 0.05 and 0.10 percent and 2.5 percent fish meal diets are fed to groups of layers for 10 28-day periods and laying performance of the pullets is evaluated.

Results show that addition of Fermacto 500 and 2.5 percent fish meal separately to the control diet improved laying performance. The choice between local fish meal and Fermacto 500 should depend on the availability of the local fish meal, and ease with which Fermacto 500 could be imported.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0036, THE USE OF WHEAT BRAN IN POULTRY DIETS

E.W. AGUDU, (GH.020.0015)

Wheat bran (wheatnixeo feed) is produced in large quantities in Ghana. Only a little quantity is used locally, while the bulk is exported and later on imported into Ghana in the form of high protein concentrate.

The investigations therefore will help to assess wheat bran requirements in local poultry feed production, thereby cutting down the cereals (especially maize) the staple foods, which are about 4-5 times as expensive as wheat bran.

Wheat bran up to 50 percent will be incorporated into a basal diet at the expense of maize, and will be fed replicates of chickens. Investigations will be conducted on chicks, broilers, growers and layers.

Preliminary results with broiler finishers and replacement growers where the diets fed were kept isonitrogenous, showed body weight decrease wheat bran.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0037, PROTEIN REQUIREMENT OF CHICKENS IN TROPICAL ENVIRONMENT - PROTEIN LEVEL FOR CHICKS

E.W. AGUDU, (GH.020.0016)

In the tropical environment, information is lacking on the protein requirements of fowl. Very often requirements based on temperature environment are used. The investigations here will test a wider range of protein levels below and above the conventional USA NRC protein level for chicks 0-8 weeks, and to find out the optimum requirement and to observe the effects, if any, of the starter protein levels on laying performance.

Five diets with protein levels of 24, 22, 20, 18 and 16 percent are fed to replicated groups of chicks to 6 weeks of age. From 6 to 20 weeks the chicks are fed on growing mash. At the layer stage, production records are kept for one year.

Chicks showed growth and feed efficiency response to increasing protein levels. No definite starter diet effect on laying

performance was observed. The starting protein diet could be reduced to 16-18 percent protein.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0038, AN ECONOMIC ANALYSIS OF PRIVATE COMMERCIAL PIG FARMING IN THE ACCRA URBAN AREA
K. AMONOO, (GH.020.0017)

Objective: 1) To throw some light on the costs and returns of the enterprise and help determine the chief economic factors which influence profit. 2) To stimulate interest in the keeping of accounts and records without which correct decision-making is virtually impossible.

Approach: This is a production survey aimed at stressing the importance of an economic approach to farming. Data is being collected from farms through direct observation and measurement. These farms are situated at reasonable distances from the Institute. Special record sheets have been designed in four different colours for easy identification, and at regular intervals the information sheets, duly completed by the farmers, are collected for analysis.

Progress: Background information which was collected from the farms have already been published. The physical and financial information for the first year are now being analysed and it is hoped that such data will be used in planning pig farms.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

3.0039, THE FEEDING OF WHEAT BRAN TO CATTLE (SOME OBSERVATIONS ON FATTENING MATURE CATTLE ON WHEAT BRAN AND BAGASSE)
K. OWUSUDOMFEH, (GH.020.0018)

Objective: (1) To evaluate the performance of mature cattle (bought from the neighbouring countries for our slaughter houses) finished on wheat bran with bagasse supplementation. (2) Effect of different levels of bagasse on wheat bran utilization.

Approach: The animals were divided into six groups of 14 bullocks. The control group was on mixed pastures of Synodon plectostachus, Digitaria decumbens, Panicum maximum and Andropogon gayanus. The other groups were fed wheat bran and bagasse ad libitum as shown: Group 1; 100%/0% Wheat Bran-Bagasse; Group 2; 90%/10% Wheat Bran-Bagasse; Group 3; 80%/20% Wheat Bran-Bagasse; Group 4; 70%/30% Wheat Bran-Bagasse; Group 5; 60%/40% Wheat Bran-Bagasse; Group 6; grazing on Bagasse only.

Progress: The investigation is already completed. Feed intake values of wheat bran tended to increase with increasing percentage of bagasse in the diet. A level of at least 20% bagasse should be included in the diet. The investigation also showed that it might not be economical to fatten the mature animals from the neighbouring countries.

SUPPORTED BY Animal Research Inst. - Achimota, Ghana

ANYINASI AGRICULTURAL EXPERIMENTAL STATION

P.O. Box 10, Anyinasi, Nzima

3.0040, COCONUT FERTILIZER TRIAL (NPK MG)
E.D. ARKURST, (GH.062.0001)

Objective: To study the effects of the application of NPK Mg fertilizer on coconut palms planted under 2 methods of establishing plantations.

Approach: 2 x 2 x 2 x 2 x 2 NPK Factorial. Half of the area carrying on replication was burnt and the other half unburnt. 32 plots each with 13 palms.

Progress: Yield of palms were as follows, 1963-1969; burnt plots 4,437; unburnt plots 8,947; Total average weights of fresh kernel were: burnt plots 2,860.48 lbs; unburnt 3,521.54 lbs.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0041, COCONUT FERTILIZER TRIAL NP (KMG)
E.D. ARKURST, (GH.062.0002)

Objective: To study the effects of the application of fertilizers on growth, flowering and kernel yield of palms.

Approach: Complete randomized block design with 8 treatments replicated 5 times. 8 trees per plot. Fertilizers used include urea, single super-phosphate, potash, magnesium sulphate.

Progress: Growth measurements are being recorded every three months.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0042, COCONUT SPACING TRIAL
E.D. ARKURST, (GH.062.0003)

Objective: To study the growth and yield of coconuts under the following planting spacings: 1. 20' x 20' - 140 trees/acre; 2. 28' x 28' - 70 trees/ acre.

Approach: Each plot was planted up without any experimental design.

Progress: Yield of units for 8 years gives an average yield of nuts per year of 1,840 for planting at 20' x 20' and 1,940 nuts for 28' x 28'. The fronds of the closer planting are poorly formed and the nuts are smaller.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0043, COCONUT DEPTH OF PLANTING TRIAL
E.D. ARKURST, (GH.062.0004)

Objective: To study the relationships between depth of planting coconut seedlings and their subsequent growth and yield.

Approach: Randomised plots of three treatments with 3 replications. 60 palms per plot. Area - southwestern Ghana at two stations.

Progress: Growth measurements are being taken every three months.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0044, COCONUT INTERCROPPING TRIAL
E.D. ARKURST, (GH.062.0005)

Objective: To observe the effects of intercropping on the establishment of coconuts and to compare with natural bush and weed cover.

Approach: Randomised block of 3 treatments with three replications with 60 palms per plot. Treatments used were: 1. No intercrop; 2. Intercropping with food crops 1-2 meters away from

seedlings. 3. Intercrop planted at 5' radius from palm. Intercrops used are maize, groundnuts and cassava in succession.

Progress: In the 4th year of growth, palms intercropped looked thin and unhealthy, especially those in treatment. (2) Intercropping ceased in 1961. Yield of palms continues to be recorded.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0045, COCONUT AGE OF SEEDLING TRIAL
E.D. ARKURST, (GH.062.0006)

Objective: To study the relationship between ages of seedlings established, and growth, flowering and yield of coconuts.

Approach: Complete randomized layout with 4 treatments. Seedlings of 6, 13, 17 and 20 months were used, replicated 5 times. 9 palms per plot.

Progress: Growth measurements being taken every 3 months.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0046, RUBBER NP (KMG) FACTORIAL TRIAL
E.D. ARKURST, (GH.062.0007)

Objective: To study the response of new budded clones to fertilizers with regard to: (a) Rate of growth; (b) Yield; (c) Bark renewal.

Approach: Randomised block with 8 treatments in 4 replications. Each of 8 clones is replicated in each block and all clones appear in each block.

Progress: Clones RRIM 605, 600, Harbel I RRIM 623 appear to respond to fertilizer treatment best.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0047, RUBBER CLONE MUSEUM
E.D. ARKURST, (GH.062.0008)

Objective: To study the performance of all available clones in Ghana and to superimpose on these clones various tapping systems.

Approach: Ramdomised block replicated 4 times each containing replicated line plots of 21 clones. Each time of clone consists of 21 experimental trials. Area of experiment - S. Western Ghana.

Progress: Growth measurements have been taken every three months by measuring the girth since 1963. The clones have reached tappable stage. Yield of later in the form of lumps of each line plot to be recorded.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0048, RUBBER STOCK/SCION RELATIONSHIP TRIAL
E.D. ARKURST, (GH.062.0009)

Objective: To study the compatibility of clones of 4 selected root stocks with those of unselected root stocks.

Approach: 5 x 3 Latin square. Each plot consists of 25 experimental trees, 8 of each of the clones budded on the same root stock.

Progress: Growth of all clones of root stocks TJir 1 x Tjir I. Tji 1 x BDW and unselected has been vigorous, but laps soon TJir 1 x Tjir 16 and Tjir 1 x BDS.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0049, RUBBER CLONE TRIAL 1965 A AND 1965 B
E.D. ARKURST, (GH.062.0010)

Objective: To study the performance of old and new clones with regard to growth, latex yield and resistance to wind damage and diseases.

Approach: Randomised block replicated 5 times. In trial A there are 9 plots in a block of 50 trees. In trial B, 10 plots in a block of 48 trees per block. Area of experiment - southwest Ghana.

Progress: About 50 percent of trees planted in 1965 failed and were replanted in 1966.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0050, RUBBER INTERCROPPING EXPERIMENT
E.D. ARKURST, (GH.062.0011)

Objective: To study the effects of intercropping with food crops on the rate of growth and yield of rubber.

Approach: Trial A and B originally intercropped with plantain and cocoyam respectively but they did not thrive. The intercrops were substituted with maize, groundnuts and cassava. Cassava was used to demonstrate to farmers against its use in rubber due to Fomes. Three treatments used as follows: 1) No intercrop; 2) Intercrop 6 ft from rubber; 3) Intercrop 2 - 4 ft from rubber.

Progress: Preliminary results indicated intercrop at 3' - 4' produced the best growth of rubber, possibly due to good effects of leguminous crop, which after harvest is ploughed in.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0051, RUBBER CLONAL SEEDLING FAMILY TRIAL
E.D. ARKURST, (GH.062.0012)

Objective: To study the performance of 4 clonal seedling families under single superphosphate application and its residual effect.

Approach: 4 x 4 latin square. Plot size of 100 trees (4 lines of 25 trees each) with half plot fertilized.

Progress: After six years, girth measurements reveal that average girth of fertilized plants of all crosses is 17.22 inches and that of non- fertilized plants 16.97 inches. Percentage increase in girth of all crosses due to phosphorous application were: 20 - 30 percent in 1964; 13-15-21 percent in 1965; and 0.5 percent - 15.6 percent in 1966 when fertilizer application ceased.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

ASUANSI SUBSTATION

Asuansi

3.0052, ROOTSTOCKS FOR LATE VALENCIA ORANGE
W.S. ABUTIATE, (GH.071.0001)

Objective: To determine the overall effects of each of five rootstocks (Rough lemon, Cleopatra mandarin, Sampson tangelo, Lake tangelo and Agego sweet orange) on the growth, disease resistance, yield and fruit quality of the late valencia crop.

Approach: Involves the laying down of a 5 x 5 latin square trial at Asuansi using the five rootstocks. Growth measurements would comprise taking average tree height and scion girth measurements 6 inches above the union of all the varieties and assessing vigour and growth of each variety during the first five years of growth.

Commencing from the first harvest, yield recording of each variety would be initiated and would continue annually for about 10 years. Fruit quality would be assessed in the 5th year of bearing and would comprise determinations on fruit size, rind texture and thickness, % juice content of fruit, acidity, T.S.S. and sugar/acid ratio.

Progress: Preliminary measurements have shown that Rough lemon grew fastest and the Agego sweet orange slowest among the stocks. During the analysis, Sampson tangelo was entered as a missing treatment because of poor establishment of this rockstock. Mean yields for four years (1967-70) for the other rootstocks have shown that Cleopatra mandarin gave the highest yield of 9 tons and Agego sweet orange the lowest yield of 6 tons per acre. Rough lemon and Lake tangelo yields were about the same.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

DEPARTMENT OF ANIMAL SCIENCE

P.O. Box 68, Legon, Accra

3.0053, SHEEP BREEDING

L.O. NGERE, (GH.322.0001)

Objective: To evolve a medium sized meat sheep.

Approach: Crossbreeding of the local ewe with the Blackheaded Persian Ram.

Progress: The Nungua Blackhead sheep has been evolved.

SUPPORTED BY University of Ghana - Accra

3.0054, CROSSBREEDING FOR DAIRY PRODUCTION

L.O. NGERE, (GH.322.0002)

Objective: To develop a local dairy cow.

Approach: Crossbreeding of the Ndama, West African Shorthorn and Gudali with imported Gersey and Friesian semen.

Progress: F1, F2 and 3/4 Jersey crosses have been produced and their performance being studied.

SUPPORTED BY University of Ghana - Accra

3.0055, STUDIES INTO SKIN DISEASES OF FARM ANIMALS

E.N. OPPONG, (GH.322.0003)

Objective: To study the types, their aetiology and treatment of skin diseases of farm animals.

Approach: Surveys, lab. studies and chemotherapeutic trials.

Progress: Streptothricosis, demodicosis, mycosis and besnoitiosis diagnosed. Treatment trials in progress.

SUPPORTED BY University of Ghana - Accra

3.0056, IMMUNOLOGICAL STUDIES INTO ANIMAL TRYPANOSOMIASIS

R.K. ASSOKU, (GH.322.0004)

Objective: To study the serology and haematology of trypanosomiasis infection in the laboratory.

Approach: Use of laboratory rats and mice.

SUPPORTED BY University of Ghana - Accra

3.0057, THE USE OF BYPRODUCTS OF CASSAVA PROCESSING FOR LIVESTOCK FEEDING

R.E. LARSEN, (GH.322.0005)

Objective: To use the byproducts of Cassava processing for animal feeds.

Approach: Analysis of various cassava byproducts, acceptability trials, feeding trials and incorporation into various rations.

SUPPORTED BY University of Ghana - Accra

3.0058, STUDIES OF THE GUINEA FOWL (NUMIDIA MELEAGRIS)

G.E. WILLIAMS, (GH.322.0006)

Objective: To find the nutritive requirements of the local guinea fowl, and study its biology.

Approach: Laboratory studies.

Progress: Sexing of birds within two days of hatching.

SUPPORTED BY University of Ghana - Accra

3.0059, INTERCROPPING OF SHEEP UNDER PLANTATION CROPS

F.K. FIANU, (GH.322.0007)

Objective: Intercropping of sheep under plantation crops.

Approach: Sheep under mango, citrus, avocado and oil palm plantation.

SUPPORTED BY University of Ghana - Accra

DEPARTMENT OF BOTANY

P.O. Box 71, Legon, Accra

3.0060, GENETICS OF COWPEA - VIGNA UNGUICULATA

E. LAING, (GH.342.0001)

Objective: Genetics (formal, cytogenetic, quantitative) of cowpea, especially of features of agricultural importance.

Approach: Hybridization, cytology, electrophoresis (later, mutation).

Progress: Formal genetics of qualitative characters established in some local varieties; number of effective factors for components of yield established for some lines.

SUPPORTED BY University of Ghana - Accra

3.0061, GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA

G.C. CLERK, (GH.342.0002)

Studies on germination of the sporangia and survival of the sporangia in both air and soil. Behaviour of zoospores produced during indirect germination of the sporangia extensively studied to define longevity of the motile phase and chemotaxis of the zoospores.

Zoospores were motile for 84 h. in distilled water at 17 degrees C. Motility time was reduced by non-optimal temperatures, high zoospore density, CaCl 2, MgSO4.7H2O, glutamine, glucose, buffer solutions and by frequent contact of zoospores with solid surfaces. Zoospores were disintegrated at pH 2.2 - 5.0 and by 1.0 mM CuSO4 and FeCl 2 and 1% peptone solutions. Velocity of

movement increased as temperature rose from 8 to 33 degrees C.

Zoospores were attracted by cocoa pod extract, asparagine, glutamic acid, glycine, aspartic acid, glutamine, serine, threonine, fructose, glucose, maltose and sucrose.

Sporangia formed zoospores at 10 to 34 degrees C with optimum at 22 degrees C but produced germ tubes at 30 and 34 degrees C only. Several amino acids and carbohydrates depressed zoospore formation at 22 degrees C., while some amino acids and carbohydrates could induce germination by germtubes at 22 degrees C.

SUPPORTED BY University of Ghana - Accra

3.0062, SCREENING OF GHANAIAN PLANTS FOR ALLELOPATHIC SUBSTANCES

K.O. MENSAH, (GH.342.0003)

Objective: To test exudates from a wide range of plants for inhibitory substances, and their possible role in various ecological processes.

Approach: Exudates and leachates will be collected and tested for their inhibition of seed germination and growth of associated species.

Progress: Only three plants have been tested - Cycas circinalis, Typha sp. and Falbotiella gentii. These are principally preliminary trials and have not yielded much of results worth reporting. However, the study will be extended in due course to include other plants.

SUPPORTED BY University of Ghana - Accra

3.0063, ROOT ECOLOGY OF KHAYA IN GHANA

K.O. MENSAH, (GH.342.0004)

Objective: To study the morphology, anatomy and habits of the roots of Khaya, from seedling stages to mature plants, and relate these to their regeneration.

Approach: Root excavations; sampling of wood of roots after they have been drawn. Sample soil for analysis.

Progress: Pot studies of the seedlings have established marked differences in growth rates of roots; work is just starting on the morphology of mature trees; also their anatomy.

SUPPORTED BY University of Ghana - Accra

3.0064, THE ADAPTABILITY OF THEOBROMA CACAO SEEDLINGS TO HIGH LIGHT INTENSITY

D.U. OKALI, (GH.342.0005)

Objective: To determine if reported increases in yield of the cocoa plant in full daylight could possibly have increased photosynthesis by individual leaves as its basis.

Approach: Combination of growth analysis, measurements of leaf photosynthetic responses to increased lighting and comparisons of levels of activity of chlorophyll and photosynthetic enzymes in leaves of shade-grown and light-grown plants.

Progress: First growth analysis experiment completed; chlorophyll content and photosynthetic rates measured; data awaiting processing; follow-up experiment to begin shortly.

SUPPORTED BY University of Ghana - Accra

DEPARTMENT OF ZOOLOGY

P.O. Box 71, Legon, Accra

3.0065, ENZYMES AND THEIR VARIATION IN INSECT PESTS OF COCOA

W.Z. COKER, (GH.343.0001)

Objective: 1) Insect pests of cocoa have varied feeding patterns. Do these insects have identical digestives enzymes? 2) Can Mealy-Bug (Coccoidae) species be differentiated electrophoretically?

Approach: By use of acrylamide gel electrophoresis and staining for specific enzymes like esterases, various dehydrogenases, leucine aminopentidase and phosphatases.

Progress: 1) Bathycoelia thalassina differs from Distantiella theobroma and Sahlbergella singularis in having ADH and LDH - B. thalassina and S. singularis have cholinesterase, absent in D. theobroma. 2) Zymograms prepared for Pseudococcus njalens, P. citri, P. celtis and Ferrisiana virgata for several enzymes.

SUPPORTED BY University of Ghana - Accra

EJURA FIELD STATION

Ejura

3.0066, MANGO VARIETY MUSEUM

W.S. ABUTIATE, (GH.072.0001)

Objective: To provide a collection of good mango cultivars and to assess their performance and quality under Ghana's climatic conditions.

Approach: Importation of certified budwood and budding or grafting same on the local mango as rootstock. The resulting plants would then be set in a museum. To assess growth, the scion girth six inches above the union and average tree height would be taken annually. The growth habit of the cultivars whether the canopy is compact, open and the branches erect or spreading would be assessed.

When the trees start bearing, the bearing habit of each cultivar in relation to the local mango would be determined. Yield would be determined by number and weight of fruit. The following criteria would be used to assess fruit quality; % of sugar and acidity of the juice; fresh colour and fibre content.

Progress: The following 14 cultivars have so far been assembled and planted out: Irwin, Elden, Ruby, Florigon, Zill, Sunset, Early Gold, Jacquelin, Palmer, Springfels, Keitt, Maden, Bombay Yellow, and Alphonso. Preliminary growth observation and second year yield results have shown that Sunset and Palmer are by far the most vigourous and prolific of the cultivars. All cultivars except Keitt mature their fruit as does the local in April/May. Keitt matures its fruits in about July/August.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0067, EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.072.0002)

Network project: See GH. 061.0046. (3.0172)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

GHANA

3.0068, EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L.
S.Y. AMANQUAH, (GH.072.0003)
Network project: See GH. 061.0047. (3.0173)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0069, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.
S.Y. AMANQUAH, (GH.072.0004)
Network project: See GH. 061.0048. (3.0174)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0070, DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE
S.Y. AMANQUAH, (GH.072.0005)
Network project: See GH. 061.0049. (3.0175)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0071, INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS
E.A. ADDISON, (GH.072.0006)
Network project: See GH. 061.0050. (3.0176)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0072, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA
S.Y. AMANQUAH, (GH.072.0007)
Network project: See GH. 016.0051. (3.0177)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0073, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS CAPSULARIS
S.Y. AMANQUAH, (GH.072.0008)
Network project: See GH. 061.0052. (3.0178)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

FOOD RESEARCH INSTITUTE
P.O. Box 20, Accra

3.0074, THE DEVELOPMENT OF TRADITIONAL FISH PROCESSING
G. OKRAKUOFFEI, (GH.080.0002)

OBJECTIVE: 1. To rationalise traditional processing techniques and cost relationships; 2. Improvement of processing facilities; 3. Prolonging storage life of processed fish products.

APPROACH: 1. Selection of the most valuable types for smoking; 2. Identification of traditional fish processing characteristics; 3. Redesign of facilities by simple modification; 4. Development of new fish products, e.g. krupkuk, kippers and fermented fish; 5. Costing of processes.

PROGRESS: Simple modifications to the traditional ovens have been extended and adopted by some smokers, using local fish, for instance Krupkuk, has been developed.

SUPPORTED BY Food Research Institute - Accra, Ghana

3.0075, DEVELOPMENT OF WEANING FOODS FROM VEGETABLE PROTEIN SOURCES
J.M. KORDYLAS, (GH.080.0003)

OBJECTIVE: To produce high level protein mixtures for infant feeding at the following levels: (a) clinical treatment of Kwashiokor; (b) malnourished children; (c) commercialised baby food.

APPROACH: Determine the nutritive value of two vegetable sources of protein - groundnut and agushie powders.

PROGRESS: NPU and PER studies (animal work) are being carried out to determine the biological values of these vegetable sources of protein before they are incorporated into various compounded formulae.

SUPPORTED BY Food Research Institute - Accra, Ghana

3.0076, PRODUCTION OF WINES FROM LOCAL FRUITS AND VEGETABLES
C. DEGRAFTJOHNSON , (GH.080.0004)

OBJECTIVE: 1. To test the wine producing capabilities of selected local fruits and vegetables; 2. To check the effect of orthodox wine yeast on these local materials.

APPROACH: The sugar content of selected material is standardised; the material treated with baker's yeast (the yeast commonly available) and yeast nutrient added. Open fermentation allowed for 4-5 days.

PROGRESS: Oranges, pineapples and tomatoes were found suitable but alcohol content lower than normal due to the use of baker's yeast.

SUPPORTED BY Food Research Institute - Accra, Ghana

3.0077, THE CHEMICAL COMPOSITION OF COMMERCIALLY IMPORTANT GHANAIAN FISHES
K.K. EYESON, (GH.080.0005)

OBJECTIVE: To provide basic information on the composition and nutritive value of the fish to serve as a standard for assessing the effect of handling and processing.

APPROACH: Proximate and mineral content.

PROGRESS: Seven spp. of fish have been analysed.

SUPPORTED BY Food Research Institute - Accra, Ghana

3.0078, THE DEVELOPMENT OF READY-TO-EAT CANNED GHANAIAN FOODS
J.B. AGUBRETUATA, (GH.080.0006)

OBJECTIVE: 1. To study the canning properties and conditions of selected Ghanaian food preparations. 2. To determine the canning process for best effect.

APPROACH: Comparison is being made between canning after cooking and the use of the canning process as well as some precooking and their effect on the final product.

PROGRESS: A number of stews and soups have been canned and are in storage for testing.

SUPPORTED BY Food Research Institute - Accra, Ghana

3.0079, THE DEVELOPMENT OF SEMI-FINISHED, FERMENTED, AND DEHYDRATED MAIZE MEAL

A. ANDAH, (GH.080.0007)

OBJECTIVE: To develop factory scale maize meal as raw material for making maize products and preparations.

APPROACH: 1. Isolation and culture of microbes occurring during fermentation; 2. Chemical changes during fermentation of maize meal; 3. Rationalization of dehydration process.

PROGRESS: Loss of flavour occurs on dehydration; determination of acids responsible for flavour.

SUPPORTED BY Food Research Institute - Accra, Ghana

3.0080, FOOD COMPOSITION TABLES

K.K. EYESON, (GH.080.0008)

OBJECTIVE: To compile a table of basic chemical composition data, through chemical analyses, on raw and cooked local foods.

APPROACH: Proximate analyses and mineral content of 1. Cereals and cereal products; 2. Starchy roots, tubers and their products; 3. Grains and legumes; 4. Nuts and seeds; 5. Fruits and vegetables; 6. Meat and meat products; 7. Marine and freshwater fishes; 8. Milk and milk products; 9. Miscellaneous items.

SUPPORTED BY Food Research Institute - Accra, Ghana

FOREST PRODUCTS RESEARCH INSTITUTE

P.O. Box 63, Kumasi

3.0081, VEGETATIVE PROPAGATION

S.P. BRITWUM, (GH.100.0001)

Objectives: To develop techniques for propagating asexually valuable timber species in Ghana.

Approach: Attempting various methods of grafting, air-layering and rooting of cuttings and investigating the various factors affecting the success of grafts, rooting of cuttings and air-layers.

Progress: Various grafting methods have been tried. The forest method of budding has so far been found the most successful method of grafting many of the timber trees in Ghana. Rooting of cuttings and air-layering have been tried and found successful for some timber trees in Ghana.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0082, SELECTION OF PROVISIONAL PLUS TREES

S.P. BRITWUM, (GH.100.0002)

Objective: To select trees of outstanding phenotypes of valuable timber species - Terminalia ivorensis, Triplochiton scleroxylon and Cedrela odorata for breeding purposes. The main objective is to provide improved seeds for afforestation.

Approach: Cruising the virgin forests and plantations throughout the country to select the provisional plus trees.

Progress: Sixty provisional plus trees of the above named species have been selected.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0083, PROVENANCE TRIAL OF TEAK AND TERMINALIA IVORENSIS

S.P. BRITWUM, (GH.100.0003)

Objective: To determine the best seed sources for Teak and Terminalia ivorensis.

Approach: Collection of seeds of Teak and Terminalia ivorensis from different geographical areas. The seeds are sown and transplanted to the field. Information on growth characteristics are gathered to determine which seed source provides the most desirable trees.

Progress: The seeds for the trial have been collected and sown in the nursery. The trial is now in the nursery stage.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0084, ESTABLISHMENT OF CLONAL SEED ORCHARDS

S.P. BRITWUM, (GH.100.0004)

Objectives: To develop and supply superior seeds for afforestation.

Approach: Clones of plantation species - Cedrela odorata, Terminalia ivorensis and Triplochiton scleroxylon are obtained and these are used in the establishment of the orchards.

Progress: Eight acres of Cedrela odorata; 10 acres of Terminalia ivorensis and 10 acres of Triplochiton scleroxylon clonal seed orchards are under development.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0085, ESTABLISHMENT OF CLONE BANKS

S.P. BRITWUM, (GH.100.0005)

Objective: To centralize and prescribe selected provisional plus trees and to provide material for breeding purposes.

Approach: Scion materials are collected from provisional plus trees and then grafted on to rootstocks. The clones obtained are established in the bank.

Progress: A clone bank is being established near Kumasi. The bank so far has a total of 44 clones comprising of 23 Cedrela odorata, 16 Terminalia ivorensis, 7 Triplochiton scleroxylon, and one Afrormosia elata.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0086, TIMING OF TROPICAL SHELTERWOOD OPERATIONS

S.P. BRITWUM, (GH.100.0006)

Objective: To determine if the time of year of original canopy reduction is significant to success, using the standard T.S.S. method with the modification of pre-overwood removal.

Approach: Thirty-six plots grouped into 3 blocks of 12 plots each are to be established, each block constituting a replicate. Timber cutting, canopy opening and clearing treatments are carried out. Girth increment sample plots are established for increment and regeneration assessment by diagnostic sampling.

Progress: Treatments have been carried out in the 36 plots. Girth increment sample plots are yet to be established for assessment.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

GHANA

3.0087, TIMING OF POST-EXPLOITATION TREATMENTS AND THEIR EFFECTS ON REGENERATION, GROWTH AND INCREMENT

S.P. BRITWUM, (GH.100.0007)

Objective: To assess the "silvicultural condition" of the forest treated under the post-exploitation treatments which combines features of T.S.S. and selection treatments, but separated in time: the exploitation year and one year after exploitation.

Approach: Treatments composed of poisoning, timber cutting and cleaning are carried out after exploitation. Girth increment sample plots of area 2.5 acres are laid out after treatment and assessed by the "LD-method" of the diagnostic sampling technique.

Progress: Exploitation and the prescribed post-exploitation treatments have been carried out. Regeneration and girth increment plots have been established. Measurements are now being carried out periodically.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0088, THE SILVICULTURAL EFFECT OF INTENSIVE FELLING ENVISAGED IN FUTURE FELLING CYCLES ON FOREST BEING WORKED ON SELECTION BASIS

S.P. BRITWUM, (GH.100.0008)

Objectives: a) To determine the silvicultural affect of intensive exploitation envisaged in future cycles, on forests being worked on selection basis. b) To determine the extent of exploitation damage to class I trees in the 5' - 9' girth class range.

Approach: An area of 200 acres is divided into 10 acre plots, and the whole area stock surveyed. After exploitation all 9'-plus and girth class I species and all 5'-plus and girth class II species are poisoned. Five post-exploitation treatments replicated four times in a randomized block design are carried out. Assessment plots of 2.5 acres are laid in each treatment plot and increment on sample trees measured once in two years.

Progress: The 10-acre treatment plots have been laid out and the 5 post-exploitation treatments have been carried out . The assessment plots of 2.5 acres are now being laid out.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0089, TENDING OF EMERGENT CROPS TREATED UNDER T.S.S. AND P.E.S. - ASCNONYO RESEARCH CENTER

S.P. BRITWUM, (GH.100.0009)

Objective: To determine the effect of modified selection treatment on the rate of growth and survival of commercial timber crops, 15 plus years old, treated under the uniform system by the application of T.S.S. and P.E.S. techniques.

Approach: Compartments which have been treated under T.S.S. and P.E.S. are cut into strips and tending treatments are carried out in alternate strips. Periodic girth increment measurements are carried out on all commercial species in both the treated and control sample plots.

Progress: Tending treatments involving 100 percent timber cutting, cutting or poisoning all non-economic species, competing with class I or II species, cutting and poisoning non-class I species overshadowing class I species have been carried out. Girth increment sample plots have been established and measurements are carried out once in every two years.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0090, ASSESSMENT OF REGENERATION OF PERICOPSIS ELATA

S.P. BRITWUM, (GH.100.0010)

Objective: To trace the growth and survival of tagged seedlings of the species over a period of time to determine the factors which control the progress from the seedling to the established stage.

Approach: Assessment plots are established where regeneration of the species is profuse. Two treatments - clearing and no clearing - are carried out. Assessment involves height measurement of each tagged seedling. Notes on canopy density, survival/-vigor of each seedling are kept.

Progress: The assessment plots have been established; height measurements of the tagged seedlings and collection of other data are being carried out every three months in the first 3 years and thereafter, twice yearly.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0091, ENRICHMENT PLANTING IN THE HIGH FOREST, USING INDIGENOUS SPECIES WHOSE RATES OF GROWTH HAVE BEEN SLOW UNDER NATURAL FOREST TREATMENTS

S.P. BRITWUM, (GH.100.0011)

Objective: To devise a technique for enrichment planting in the High Forest using slow growing indigenous species.

Approach: Site preparation treatments involving timber cutting and poisoning of non-economic species are carried out. Strip planting of Pericopsis elata, Entandrophragma spp. and Khaya ivorensis are carried out 1 chain between strips and one-fourth chain between plants within strips.

Progress: An area of 10 acres has been strip planted with the above named species.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0092, STUDIES ON AMBROSIA BEETLE POPULATIONS IN THE FOREST ZONES OF GHANA

S.K. ATUAHENE, (GH.100.0012)

Objective: Much work has been done on the extent of damage caused by ambrosia bettles to commercial logs in the forests of Ghana, but very little information exists on the actual composition and annual fluctuations of individual beetles in these forests.

Progress: Trapping experiments have revealed that most of the known tropical genera within the families Scolytidae and Platypodidae exist in the moist semi-deciduous forests and the rain forest vegetation of Ghana. Trapped beetles are being analyzed into Scolytid/Platypodid ratio, seasonal fluctuations of individual species, and the most abundant Scolytid/Platypodid species occuring within the various ecological situations.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0093, STUDIES ON THE BIONOMICS OF POTENTIALLY DANGEROUS INSECTS ATTACKING INDIGENOUS PLANTATIONS OF ACCEPTED EXPORT TIMBER SPECIES

S.K. ATUAHENE, (GH.100.0013)

The objectives are to study the biology, ecology and where possible, the control of insect pests that are known to be, or are potentially dangerous to plantations of indigenous species.

Progress: A country-wide survey of insect pests in all the important forest plantation areas has begun. The following insects have come out as serious pests: Phytolyma sp. on Chlorophora excelsa (Wehv) Bth. and Hk.f., Diclidophlebia eastopi; Voudracek (Hemoptera; Psyllidae) on Triplochiton scleroxylon K. Schum., Tridesmodes ramiculata Warr. (Lepidoptera: Thyridae) on Terminalia ivorensis A. Chev; and Hypsipyla sp. (Lepidoptera; Pyralidae) on Mahogany.

Biological and ecological studies are being done on Diclidophlebia eastopi.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0094, STUDIES ON PESTS OF FOREST TREE SEEDS IN GHANA

S.K. ATUAHENE, (GH.100.0014)

The objective is to find out and identify pests affecting the fruiting of indigenous forest trees, and where practicable, to control the infestation.

Progress: A complex of insect pests responsible for severe reduction in the quantity and quality of fruits of Triplochiton scleroxylon K. Schum and Terminalia ivorensis A. Chev. has been surveyed. The most important of these include Apcu ghanaenis Voss; A. nithonomoides Voss, Nanophyes sp. and Auletobius kuntzeni III. The extent of damage caused by these insects is being studied on selected trees.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0095, SCREENING TEST OF SPECIES AND TWO PRESERVATIVES AGAINST MARINE BORERS

J.E. BARNACLE, (GH.100.0015)

Objective: To determine (1) type, genera and species of borers present and conditions necessary for them to attack, (b) resistance of various local species to attack by one or all of borers.

Approach: Collection of boring animals from trap stakes and nearby wharf structures. Test specimens hung just below low tide at two sites on the coast and condition determined at 3 - 4 monthly intervals by x- ray and by subjective assessment.

Progress: After 2 years exposure, specimens being attacked by at least 2 Teredinid borers and 1 Pirlad borer. One crustacean and possibly a second crustacean present (in piling), but not attacking specimens. More trap stakes will be set using different assemblies to determine how all 4 borers can be induced to attack.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0096, DIFFUSION-IMPREGNATION OF BUILDING TIMBER IN BORON-BASED PRESERVATIVE FORMULATIONS

F.F. AMPONG, (GH.100.0016)

Objective: To determine the effectiveness of the diffusion method of preservative treatment for the treatment of non-durable timber species for use in buildings under non-leaching conditions.

Approach: Sawn timber of non-durable species of various dimensions are dipped in a known concentration of the preservative, block stacked for periods dependent on sizes, dried and tested for the depths of penetration of the toxic components of the preservative.

Progress: Three non-durable species and the sapwood of a durable one mated by diffusion and found treatable by the method.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0097, EFFICACY OF PRESERVATIVES UNDER GHANAIAN CONDITIONS

J.E. BARNACLE, (GH.100.0017)

Objective: As a first step to obtain quickly an estimate of preservative performance in round wood in Ghana.

Approach: To find and examine poles in service for 20 years plus to obtain estimate of average life of properly treated poles. Comparison of these data with those for more recently treated poles failing prematurely will give indication of corrective measures necessary for improved future performance.

Progress: Inspection of more than 2,000 poles in Northern Savannah and secondary moist semi-deciduous zones now complete. Report being drafted.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0098, TESTING NEW SPECIES FOR USE AS RAIL SLEEPERS

J.E. BARNACLE, (GH.100.0018)

Objective: To increase the number of species that can be used as rail sleepers in Ghana.

Approach: To determine location and availability of species likely to be suitable for rail sleepers to get them cut, seasoned, treated and installed in service together with currently acceptable species. Emphasis will be on testing species rather than preservatives.

Progress: Suitable species have been nominated and agreement reached with forestry department and railways. Funds for purchase of some sleepers have been obtained. Preliminary discussions had with large sawmill regarding supply.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0099, FIELD TEST OF TREATED ROUND POSTS FOR FENCING

J.E. BARNACLE, (GH.100.0019)

Objective: To establish basic data on preservative treatment of suitable locally grown species and to demonstrate their suitability as fence posts.

Approach: To collect posts of species which have suitable characteristics and which can now or in the future be obtained in sufficient quantity for use as fence posts. To carry out treatment trials for determination of penetrability and any associated problems.

Progress: Tectona Grandis, Celtis spp., Gmelina arburea and Eucalyptus Naudiniana appear most likely species. Treatment problems with intermediate wood in teak, and frequently, unpredictable treated zone in posts of Celtis. Treatment of posts for field test proceeding.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0100, COMPOSTING OF SAWDUST

G. HOLOTA, (GH.100.0020)

There is abundance of unused sawdust in Ghana and at the same time agricultural activity is limited by the shortage of nutrients and organic substances in the soil.

But introduction of untreated sawdust into soil is hazardous as the lack of nitrogen in sawdust causes nitrogen deficiency and deterioration in plants.

Aim of this project is to find the most suitable method for converting sawdust into soil fertilizer of high nutrient content and good soil-moisture-air relationship regulating properties.

Kinetics of degradation of 10 species of Ghanaian woods has been determined on lab size experiments.

Trials with 500 lb and 6 tons of sawdust on 4 species have been carried on. The quality of compost prepared in that way was proved by experimental plantation of tomato and corn plants by The Faculty of Horticulture, University of Science and Technology, Kumasi. The results are very impressive.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0101, EDIBLE AND INDUSTRIAL GUMS

G. HOLOTA, (GH.100.0021)

There are many species of trees in Ghana which, due to wounding of bark or insect attack, produce exudates. These exudates, called gums, are soluble saccharides and their derivates. Gums are semisolid gelatine-like materials of polyionic nature. In appropriate solvent or swelling agent they produce highly viscous colloidal solutions. Due to these properties gums are widely used in confectionary, perfumery and and cosmetic industry or as flotating and foam-creating agents.

In the first stage of research the viscosity of gums of 14 Ghanian species of various concentration was established. At present we are working on determination of chemical characteristics of gums.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0102, TANNIN EXTRACTION

G. HOLOTA, (GH.100.0022)

There are many species of trees in Ghana which have bark rich in tannin and are used by natives for tanning. However no work was done to compare the quality of the leathers.

The aim of this project is to investigate the tannin content in selected species of wood and vegetable materials and to find the best technology for extraction of tannin.

About 40 species were already analysed and 10 species of the highest tannin content have been used as raw material for preparation of a large quantity of solid tannin extract. This extract was used for manufacturing leather. The quality of leather prepared by that way was good - of course, of different shade of colour and softness.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0103, TIMBER SPECIES FOR WOOD WOOL CEMENT SLABS

W.K. ASHIABOR, (GH.100.0023)

Objective: To test timber species for their suitability for manufacture of wood wool cement building slabs.

Approach: Species are tried for their poisoning of cement during setting by minimal fixed weights of shavings, cement and water and curing them in moulds.

Progress: Thirty-seven species of Ghanaian timber have been tested, out of which eleven were found suitable.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0104, PROPERTIES OF GHANAIAN TIMBERS

W.K. ASHIABOR, (GH.100.0024)

Objective: To test and collect data on mechanical and physical properties of Ghanaian timbers.

Approach: Standard tests on clear specimens of Ghanaian timbers are performed according to BS 373 : 1965.

Progress: Over 50 species of timbers have been tested and data is available on them.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0105, LOG CONVERSION FACTORS

W.K. ASHIABOR, (GH.100.0025)

Objective: To determine factors for converting Hoppns foot volume of logs into weights in tons.

Approach: The density of the species is determined from the weight of sample round logs and the Hoppns foot per ton factor calculated.

Progress: The factors have been determined for 36 species of timbers in Ghana.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0106, WOOD WOOL LOW COST HOUSES

W.K. ASHIABOR, (GH.100.0026)

Objective: To investigate possibility of using woodwool building slabs for low cost houses.

Approach: Design and construction of about 5 houses in three climatic regions of Ghana, taking into consideration the known properties of woodwool building slabs. Observation of the performance of the material and also recording of temperatures and radiation in houses.

Progress: First house is under construction in Kumasi.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0107, ACTIVATED CHARCOAL

B. ADAMCZAK, (GH.100.0027)

To explore the possibility of production of activated decolorizing carbon from locally manufactured charcoal.

In a laboratory apparatus, charcoal from different hardwood species will undergo activating process. The physico-chemical properties of the obtained product will be determined. The optimum conditions for manufacture of activated carbon will be established.

An activated, decolorizing carbon had been proposed with an absorption capacity of about 50% lower than that one imported into Ghana.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0108, THERMAL DECOMPOSITION OF WOOD CHARCOAL

B. ADAMCZAK, (GH.100.0028)

To determine the suitability of various hardwood species for distillation purposes.

Various hardwood species will be destructively distilled and the yield of charcoal and other distillation products together with some of their physico-chemical properties will be established.

Woods of Apromu, Dohoma, and Esa has been destructively distilled and the yield of charcoal , acetic acid, methyl alcohol, acetone, wood tars and nonconductable gas, together with some of their physico- chemical properties, were established for given conditions of distillation.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0109, PRESERVATION OF SMALL SIZED TIMBER AGAINST FUNGAL AND TERMITE ATTACK

B. ADAMCZAK, (GH.100.0029)

To find out the most suitable preservative, and method of its application, for poles of lesser-known species for Agriculture and Industry.

Pickets of natural round wood of lesser-known species have been treated with some recommended preservatives and their effectiveness examined in test-fields established in various geographical regions of Ghana.

Different kinds of wood species have been treated with wood preservatives: Aldrin/P.C.P., Creosote, Fungamin, Tanalith and Termex A, and installed in the test fields. The conditions of their pickets are being examined once a year.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

3.0110, PROTECTION OF WOOD AGAINST FIRE

B. ADAMCZAK, (GH.100.0030)

To examine the effectiveness of different fire retardant chemicals in protection of tropical wood against fire and to establish the best method of their application.

Standard samples of tropical wood will be treated with different fire retardant preservatives and the combustible properties of treated wood will be determined.

Standard samples of Mahogany, Odum, Sapele and Kusia had been treated with a mixture of boric acid-borax in the form of 25% water solution and their combustible properties are being examined by using Fire-Tube-Test.

SUPPORTED BY Forest Products Res. Inst. - Kumasi, Ghana

KETA SUBSTATION

Keta

3.0111, INVESTIGATIONS ON THE CAPE ST. PAUL WILT DISEASE OF COCONUT

E.A. ADDISON, (GH.073.0001)

Objectives: 1. To find coconut varieties resistant to the disease. 2. To find the causal agent of the disease. 3. To study the incidence and pattern of spread of the disease.

Approach: (a) Varietal resistance trial: In the absence of the knowledge of the specific cause of the disease, the obvious action is to search for resistant varieties. Dwarf varieties are imported for planting in the endemic area. (b) Spread of the disease: Regular observations are made on the spread of the disease in the affected area particularly regarding any new outbreaks. Intensive surveys are also made of the coconut areas along the coast.

Progress: The cause of the disease still remains unknown. The varietal resistance trials carried out so far have not yet yielded any encouraging results. Only one green Malayan Dwarf palm out of a total of 43 Malayan Dwarf plants planted in 1956/57 has withstood infection up to date.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

KPONG AGRICULTURAL IRRIGATION STATION

Kpong

3.0112, N.P.K. FACTORIALS - FERTILIZER TRIAL IN SUGARCANE

Y. TWENEBOAH, (GH.067.0001)

Objective: 1) To determine the fertilizer requirements for sugarcane under irrigation conditions at Kpong. 2) To determine the best source of nitrogen in the fertilization of sugarcane.

Approach: 1) Three varieties of cane CP 48-103, PR 980 and 1341227 were used with the following fertilizer levels:- N: 0, 60, 120; P2O5: 0, 50, 100; K2O: 0, 40, 80 lbs/acre. 2) Sulphate of ammonia and ammonium nitrate were used to determine which of the two is more suitable.

Progress: Results of both experiments not yet available.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0113, TREATMENT OF SUGARCANE PLANTING METHOD

Y. TWENEBOAH, (GH.067.0002)

Objective: To compare germination of canes treated with chemicals before planting and those not treated.

Approach: Four treatments were used as follows: 1) Dipping sets in Aretan 6 solution. 2) Heat treatment. Keeping setts in hot water at 50 degrees C for 2 hours. 3) Heat treatment and dipping in Aretan solution. 4) Control - No treatment.

Progress: Aretan treatment gave higher bud germination than no treatment - 62 percent as against 53 percent. The heat treatment appeared to have killed a lot of buds. Germination percentages for treatments (2) and (3) were 18 percent and 22 percent respectively. This was probably due to the fact that it was difficult to maintain constant temperature (50 degrees C).

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0114, SUGARCANE VARIETY STUDIES

Y. TWENEBOAH, (GH.067.0003)

Objective: To determine the performance of different cane varieties with different maturation periods.

Approach: 6 early maturing varieties (10 months), 8 early-medium varieties (11 months), 6 medium varieties and 5 late maturing varieties were planted out in variety trials in October, 1969.

Progress: Among the early varieties, CP 48-103, NCO 310 have the highest cane yield of 33.71 and 31.03 tons/acre with high sucrose contents of 18.70 and 17.96 respectively. They also gave the highest sugar per acre yield of 4.31 and 3.74 respectively. The low results were attributed to poor sprouting.

Early-mid varieties - yields were very low due to poor drainage, hence poor germination. However, varieties CP 44-101 and PR 1085 gave yields of 28.81 and 26.74 tons per acre respectively with sucrose content of 20.36 and 20.22.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0115, TYPE OF PLANTING MATERIAL AND SPACING TRIALS IN SUGAR CANE

Y. TWENEBOAH, (GH.067.0004)

Objective: 1) To determine the more suitable type of planting material - (a) whole cane, (b) Cut cane with 3 bud sets; 2) To determine the optimum spacing for sugarcane.

Approach: 1) Sets of canes were planted in replicated plots with whole canes and their sprouting percentage, number of canes-/acre and yield assessed. 2) Three varieties of cane CP 48-103 PR 980 and B4 1227 were planted at 3', 4', and 5' apart in rows.

Progress: 1) Preliminary results indicated whole stalk planting was not inferior to sets. Yields were 43.21 and 45.13 tons/acre respectively. Planting costs can therefore be reduced using whole canes, but straight canes must be used. 2) Results not yet analysed.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0116, CHEMICAL WEED CONTROL IN SUGARCANE

Y. TWENEBOAH, (GH.067.0005)

Objective: To determine the most effective herbicide for weed control in sugarcane.

Approach: Three herbicides, Lasso Ec.48 percent, Lasso G. 10 percent and CP44939, all pre-emergent herbicides, were tested at different rates in 1969, and in 1970, Fenac EC, Fenac Salt, Simazine/and Bladex, were introduced in addition to the above. Sprouting percentage, weed suppression and cane tillering were assessed.

Progress: Preliminary results indicated that: Lasso EC at 4 lbs Al/acre, Lasso G at 4 lbs Al/acre and CP 44939 at 3 lbs Al/acre could be effective provided they are used in combination with other herbicides which will give better control of dicots. All herbicides give good control of grass weeds but CP 44393 gave far better control than the two Lasso forms. As regards overall control of both types of weeds, Simazine and Bladex were found very effective herbicides for weed control in sugarcane. These must be applied pre-emergent to both cane and weeds; Simazine at 4 lbs and Bladex at 4 lbs active ingredient per acre.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

KUSI OIL PALM RESEARCH CENTRE

P.O. Box 74, Kade

3.0117, WEED CONTROL IN YOUNG AND MATURE OIL PALMS (ELAEIS GUINEENSIS), USING HERBICIDES

M.A. ADANSI, (GH.068.0001)

Objective: To discover, by screening trials, herbicides which are safe, efficient and economic in the control of obnoxious weeds in young and mature oil palms.

Approach: Using a polychair sprayer, various herbicide samples are obtained from manufacturers' agents for trial. Low, medium and high rates of the herbicides are applied and replicated. The effect of these herbicides on weeds and oil palms are evaluated through standard scoring techniques.

Progress: It has been found through screening trials and literature reviews that some 17 odd herbicides are safe for oil palms. Presently MSMA (Ansar 529) and Gramoxone (Paraquat)are recommended while Ametryne, Eptam 6E and Bladex have shown great promise.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0118, RAISING OF OIL PALM SEEDLINGS IN PRE-NURSERIES AND NURSERIES

M.A. ADANSI, (GH.068.0002)

Objective: To compare the various techniques of raising seedlings in nurseries and to develop a standard method best suited to conditions in Ghana.

Approach: (1) Treatments: (a) Pre-nursery in sandbeds and transplanting to a field nursery. (b) Pre-nursery in mini-poly-bags and transplanting to a field nursery. (c) Pre-nursery in mini poly-bags and transplanting to large poly-bag nursery. (d) Direct planting of germinated seed into large poly-bags, i.e. no separate pre-nursery and nursery stages.

Evaluation by taking measurements as follows: height of seedlings; circumference at base; transplantable seedlings (pre-nursery to nursery); incidence of blast (%); transplantable seedlings (nursery to field). (2) This nursery experiment was aimed at finding the most suitable time establishing dry season nurseries under the conditions of soil and climate prevalent in Ghana. This experiment was of a repeated split plot randomized block design in 5 replications.

There were 8 main treatments: Planting of pre-nursery seedlings into the nursery every first and fifteenth day of the month from 1st August to 1st November, and the 8th treatment seedlings planted in large poly-bags in June/July. Each plot was divided into 2 halves, one half being shaded with castor oil plant, the other half not shaded. One half of each sub-plot received a monthly complete fertilizer application while the other half was not fertilized.

Records kept were: Height and butt circumference of seedlings measured monthly; the number of seedlings killed by blast (census taken monthly); the number of transplantable seedlings; cost involved in each of the 8 treatments.

Progress: Treatments (c) and (d) did not differ significantly from each other, and were superior to (a) and (b). Cost of producing one seedling was lowest in (d). August/early September was not suitable for transplanting seedlings to dry season nursery.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0119, FODDER CROP IMPROVEMENT

J.B. WONKYIAPPIAH, (GH.068.0003)

Objective: To produce high yielding material of good bunch and fruit composition and to organize a seed production programme for the production of D x P extension work seed (e.w.s.).

Approach: Materials have been introduced from oil palm breeding centres in different parts of the world to form the basic stock of the O.P.R.C's breeding programme. Statistically designed progeny trials (mainly simple randomized block and balanced lattice designs) are laid out to compare T x T, D x D and T x D crosses. The D x P hybrid seed is synthesized from the best T x D combinations by obtaining the Ps from the best T x T crosses or selfings and the Ds from the best D x D crosses or selfings. (D x P hybrids). High-yielding Ts and Ds of good bunch and fruit composition are also selected for a recurrent selection programme.

Progress: About a hundred introductions have been made, mainly crosses from parents which have been progeny tested at N.I.F.O.R. (Nigerian Institute for Oil Palm Research). These are the F1s and form the basic stock of the O.P.R.C.'s breeding programme. F2s of the recurrent selection programme were planted in 1970. The total area of selection fields at the O.P.R.C. for the breeding programme stands at 176.5 acres of which 120.6 acres are in full production. About 800 duras and 12 pisiferas have been selected for the production of D x P extension work seed. The number of e.w.s produced in 1971 was 1.2 million.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0120, OIL PALM FERTILIZER REQUIREMENTS IN GHANA

J.B. WONKYIAPPIAH, (GH.068.0004)

Objective: To determine the fertilizer requirements of oil palms in the various parts of the forest belt of Ghana.

Approach: Fertilizer experiments of simple factorial designs with N, P, K, Mg, Ca were laid down by the West African Institute for Oil Palm Research (W.A.I.F.O.R.) in various parts of Ghana from 1954 to 1957. 8 - 12 year yield records together with foliar analysis data taken from these trials were analyzed. A new fertilizer experiment of a 4 x 4 x 4 x 2 confounded factorial design with N, P, and K at 4 levels and Mg at 2 levels was established at the O.P.R.C. Kade/Kusi in 1969.

Progress: Briefly, results of the simple factorial experiments were as follows: Results showed P and K deficiencies in oil palms on soils of three geological formations - Forest Oxysols and Forest Ochrosol-Oxysol. Integrates developed over granites, Lower Birrimian rocks (phyllites) and Oxysols over Tertiary sands. Consistent and highly significant yield responses of 30 - 35% to phosphate fertilizer were found in an experiment on soils over tertiary sands (Anyinasi) and in one trial on soils over granites (Assin Foso), while both experiments also showed a significant K effect in some years. A PK interaction, by which responses to potash fertilizers became highly significant (20% yield increase) in the presence of added P, was found in another trial on soils over granites (Pretsea). Yield recording in the new fertilizer trial started in 1972.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0121, IMPROVEMENT OF OIL PALM SEED GERMINATION

J.B. WONKYIAPPIAH, (GH.068.0005)

Objective: The object is to devise methods which lead to a more rapid and more regular germination of oil palm seeds and to find easier but efficient methods of germinating the unprotected seeds of fertile pisifera palms.

Approach: The shock-heat treatment: A series of experiments are carried out in which samples of seed are dipped in hot water (at 60 degrees C) for varying periods, followed by a dry temperature treatment of longer durations. The effects of these treatments are tested for seed of different ages, origins and moisture content.

Dry-heat treatment: Seeds are subjected to dry-heat treatment for varying periods (40, 47, 54, 61, 75 and 80 days). Then percentage germination is assessed for each treatment. Germination of pisifera seeds: Conditions are created for the seeds to germinate in situ, and also without removing the mesocarp of loose fruits.

Progress: There is a great variation in the reaction to the shock- heat treatment between crosses. In the dry-heat treatment there were significant differences in response between different types of extension work seed. Seeds which received 70 days heat treatment gave higher percentage germination than the standard 80 days heat treatment.

It has been possible to germinate some fertile pisifera seeds in situ.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0122, ECOLOGICAL CONDITIONS AND YIELD VARIATION IN THE OIL PALM

J.B. WONKYIAPPIAH, (GH.068.0006)

Objective: 1. To investigate the causes of variation (annual and regional) in yields of oil palms and to extend these investigations further in an attempt to predict yield levels for areas suitable for large scale oil palm development; and 2. To study the root distribution of the oil palm.

Approach: The parameter "effective hours sunshine" is used to correlate climatic data with yield variation. The extent of drought period is also correlated with yield. The extent of drought is determined by measuring the degree of midday closure of stomata with a test, using various iso-propanol/water concentrations.

Mean annual water deficit was calculated for various regions in the forest zone of Ghana. Some profile pits were dug in different soil series to study the root distribution of the oil palm.

Progress: A highly significant negative correlation could be established between the number of dry weeks and individual yields of palms.

The parameter "mean annual water deficit" has been used to define in broad terms the climatically suitable areas for economic oil palm production within the forest zone of Ghana.

Results of the root studies showed that over 55% gall roots is concentrated in the topfoot and over 80% in the first 2 feet.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0123, WATER CONSERVATION IN THE DRY SEASON BY IMPROVED CULTURAL PRACTICES

J.B. WONKYIAPPIAH, (GH.068.0007)

Objective: The object is to find a means of making a more effective use of the available water in the soil during the dry season by reducing evapotranspiration of the ground water through improved cultural practices and to investigate the effect on growth and production of the oil palm.

Approach: In Expt. 853 - 2 at the O.P.R.C., Kade/Kusi (planted 1966) two main treatments, normal brushing of the leguminous cover crop and very low brushing of the cover during the dry season, and 3 sub- treatments of ringweeding to different distances (3', 5', 7') are compared. There is a sub-sub-treatment comparing 2 different D x P e.w.s. The experiment is of a randomized block design in 5 replications.

Weekly yield recording began in 1969. Stomatal aperture tests were conducted weekly to determine the extent of water stress during the dry seasons.

Progress: The measurements of water stress in the dry seasons of 1968/69 and 1970/71 did not show any significant difference between the two main treatments, i.e. normal brushing and very low brushing, and in the sub- and sub-sub-treatments. The treatments did not show significant differences in production for the first 3 years. However a significant negative correlation was obtained between palm production and length of periods of water stress. This indicates that there are differences in water availability in the field independent of the experimental treatments due to variations in soil types.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0124, REMOVAL OF INFLORESCENCES IN YOUNG OIL PALM FIELDS

J.B. WONKYIAPPIAH, (GH.068.0008)

Objective: The object is to investigate the effect of deflowering young palms, during a certain period before first harvesting, on the vegetative growth and bunch production in the years thereafter.

Approach: Remove all inflorescences monthly in young palms using a special tool designed by the I.R.H.O. Two deflowering experiments have been superimposed on progeny trials: Expt. 852 - 1 (Planted 1964) and Expt. 853 - 1 (Planted 1966) with deflowering and non-deflowering as the sub-treatments.

Another experiment, Expt. K1-3, (Planted 1967) has been laid down to investigate the effect of removing, at monthly intervals, all inflorescences on young palms over varying periods before first harvesting on production.

Progress: In Expts. 852 - 1 and 853 - 1, the significant effect of deflowering in total bunch weight over the non-deflowered plots in the first and second years of harvest had disappeared in the third year. There was interaction between progenies and deflowering.

In Expt. K1 - 3 the second 1 1/2 years' yield (1970 - 1971) did not show significant differences between treatments.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0125, FUNGICIDE SPRAYING TRIALS IN NURSERY AND FIELD

J.B. WONKYIAPPIAH, (GH.068.0009)

Objective: The object is to test the effectiveness of different fungicides in the control of fungal disease in the oil palm.

Approach: Experiments so far conducted are aimed at using different fungicides for the control of Cercospora and Anthracnose. The fungicides being tried are: Dithane M.45, Benlate (Benomyl fungicide), Kecide and Daconil. Comparative trials on rates and frequency of application are conducted in the nursery and field, and their relative effectiveness and costs are assessed.

Progress: Trials so far have indicated that spraying with Benlate, 0.5g/lit. every 6 weeks is as effective as the standard treatment with Dithane M.45, 2g/lit. sprayed fortnightly in controlling Cercospora in the nursery. Kecide was eliminated from the trials due to its scorching effect on the leaves. Daconil sprayed at 24.6g/lit. fortnightly was effective in controlling Cercospora.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0126, OIL PALM SPACING AND DENSITY TRIALS

J.B. WONKYIAPPIAH, (GH.068.0010)

Objectives: (1) To determine the optimum spacing for oil palm under the environmental conditions. (2) To test certain spacing systems which allow intercropping. (3) To investigate the effect of systematic thinning to a lower density on the production of mature oil palms.

Approach: (1) Two experiments of randomized block design were laid down in 1956. The main treatments compared various triangular and rectangular spacings. The sub-treatments were intercropping and no intercropping. (2) Two thinning trials were conducted on two mature plantations - both were of a simple randomized block design in 2 or 3 replications. (3) Another experiment was to investigate the effect of various triangular spacings combined with double (hexagonal) spacing up to the 2nd or 3rd year of production on yield of D x P progenies with different yield composition.

Progress: A summary of the results of two-spacing and intercropping experiments (based on 10 years' yield records) at Anyinasi and Bunso is as follows: At Bunso none of the treatment effects were significant. At Anyinasi, spacing was significant.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

KWADASO AGRICULTURAL EXPERIMENTAL STATION

P.O. Box 3785, Kumasi

3.0127, STUDIES ON PLANT PARASITIC NEMATODES ASSOCIATED WITH ECONOMIC CROPS IN GHANA

O.B. HEMENG, (GH.061.0001)

Objective: The purpose of the investigation is to study the parasitic nematode fauna in the country and to isolate the economically important individuals for the study of their biology, pathogenicity and control.

Approach: Soil and root samples are collected from the fields of economic crops including sugar cane, tobacco, cotton, maize, oil palm, coconut, rubber, mango, cassava, yam, groundnut, banana, plantain, rice, pineapples and vegetables. After extraction nematodes are fixed and mounted for microscopic examination.

Progress: Nematodes from the fields of the following crops, rice, mango, coconut, oil palm, yam, banana, sweet orange, coffee and pineapple have been processed and are awaiting microscopic examination.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0128, INVESTIGATION INTO THE BIOLOGY AND CONTROL OF ROOT-KNOT NEMATODES ON SOME CROPS

O.B. HEMENG, (GH.061.0002)

Objective: The purpose of this investigation is to study the life cycles of the species of Meloidogyne attacking tomato, tobacco, kenaf and jute and to find the effective methods for controlling these nematodes.

Approach: Each tomato seedling growing in sterilized soil in clay pots has been inoculated with single larva. The seedlings will be allowed to grow for 3 months for the nematodes to multiply. Meloidogyne sp. in each pot will be indentified by examinating posterior cuticular patterns under microscope. Larvae will be inoculated to the host plants. At 2 day intervals the roots will be stained and examined to study the development of the larvae. Nemagon granules, D-D and Ethylene dibromide will be tried to determine which of them gives the best control. Varieties of tomato, tobacco, kenaf and jute cultivated in the country will be screened for root-knot nematode resistance.

Progress: Pure cultures of individual Meloidogyne species have been established and they are being multiplied in the mesh house.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0129, INVESTIGATIONS INTO THE CONTROL OF SUGAR CANE NEMATODES

O.B. HEMENG, (GH.061.0003)

Objective: The objective of this work is to determine the effective time for Nemagon application and how different varieties of sugar cane response to Press mug, molasses, trash burning and

varying rates of Nemagon granules. The influence of herbicides on sugarcane nematode population will be investigated.

Approach: The initial nematode population was estimated for every plot in each experiment. Nemagon granules at 120 lb/ac was applied at planting, 30, 60 days after planting and at monthly intervals for 3 months. For the monthly application the dosage (120 lb/ac) was divided into three and one part applied at a time. In one experiment Nemagon granules at the rates 0 lb., 120 lb. per acre was applied to 7 varieties of sugar cane. In another experiment, the treatments were 30 litres Press mug, 30 parts molasses plus 70 parts water applied to each plot (15ft. x 6ft). Trash was burnt 48 hours before planting on the appropriate plots. Six varieties of sugar cane were planted. Herbicide application will be carried out the following season.

Progress: Soil sampling to determine immediate treatment effect on the nematodes is in progress.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0130, INVESTIGATIONS INTO THE SEED-BORNE MICROFLORA OF ECONOMIC CROPS OF GHANA

E.A. ADDISON, (GH.061.0004)

Objectives: To study the diseases of important crops of Ghana that are transmitted through seed. To evolve effective methods for the detection of important seed-borne diseases. To evolve effective control measures.

Approach: Seed samples collected from various parts of the country are incubated at different temperatures and varying conditions of light for different periods. At the end of the incubation periods the seeds are examined under binocular low power microscopes and the pathogens recorded.

Progress: Rice, millet and guinea corn seeds have been studied. Several important rice pathogens have been recorded. A paper has been published in the Ghana Jnl. Agric Sci.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0131, EVALUATION OF CERTAIN FUNGICIDES FOR THE CONTROL OF SCLEROTIUM WILT DISEASE CAUSED BY SCLEROTIUM ROLFSII ON VEGETABLES AND LEGUMES

E.A. ADDISON, (GH.061.0005)

Objective: To find suitable fungicides which can be applied to growing vegetables and legumes in an infested soil to protect them against sclerotium wilt.

Approach: Chemicals are first screened in the laboratory by adding 5ml portions to PDA in petri dishes and inoculating with sclerotium rolfsii. Those chemicals which partially or completely inhibit the growth of the fungus are used for further testing in pots using tomato (Lycopersicon esculentum) and egg plant (Solanum melongena) as test plants. When suitable chemicals have been found they will be tried on the other host plants of Sclerotium rolfsii in order to establish the tolerant non-phytotoxic dose for each host.

Progress: Of the chemicals tried to date, only formaldehyde of 10ml in 500ml water and 10ml in 800ml water and mercuric chloride at 1g in 500ml water gave complete control.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0132, INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON

G.K. BUAHIN, (GH.061.0006)

Objective: To study the bionomics of the most important insects which damage cotton and to test insecticides and to devise suitable control strategies to reduce the losses due to insect damage.

Approach: 1. A countrywide survey of insect pests of cotton was conducted by maintaining micro-plots (1/20 ac.) of cotton planted at monthly intervals and studying the insect pest complex on the crops (3 years). 2. Uses of light traps and trap crops to study activity of insect pests. 3. reduction of damage done by insects.

Progress: The destructive insects of cotton in Ghana have been identified and catalogued. Their distribution and bionomics have been partially studied. The bollworms - Pectinophora gossypiella, Earias biplaga, Prodenia litura and Heliothis armigera, axgyroploco leucetreta, Diparopsis watersi are the most important insect pests of cotton. Dysdercus spp. causes damage to the bells and lint during the latter stages of the crop. Some 50 other minor insect pests were observed.

For their control the recommended pesticides are Toxaphene/DDT, Endrin/DDT and Nuvacron. Work is still continuing on the economics of pesticide use and the evaluation of ultra low volume spray techniques and new pesticides. The effect of pesticides on non-target insects is also being studied.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0133, VEGETABLE PESTS AND EVALUATION OF INSECTICIDES FOR THEIR CONTROL

G.K. BUAHIN, (GH.061.0007)

Objective: To study the bionomics of the most important insect pests which cause economic crop losses to vegetables intensively cultivated in Ghana and to evolve suitable control measures. Vegetable crops covered in investigations: tomato, (Lycopersecum esculentum); eggplant, (Solanum melongena); cabbage and lettuce (Brassica sp.); okra, (Hibiscus esculentus) and cowpea, (Vigna spp.).

Approach: 1. Survey of insect pests on micro-plots (1/10 acres) cultivated in 3 typical agroclimatic zones and studies on population dynamics, and biology of insect pests. 2. Testing suitable chemicals for their control.

Progress: 1. Recommendations for the control of leaf eating insect pests on okra, cabbage, tomato and eggplant made as a result of investigations include the use of liquid and dust formulations of Sevin, Malathion, Agrothion and Nuvacron. 2. Investigation on the insect pests of cowpeas is continuing. The important insect pests of cowpeas feed on the buds, flowers and pods and they are Maruca, Euchrysors and Riptortus. Nuvacron and Agrothion are two insecticides which have so far shown promise in the screening of suitable pesticides.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0134, INVESTIGATION INTO THE INSECT PESTS OF BAST FIBRES AND THEIR CONTROL

G.K. BUAHIN, (GH.061.0008)

Objective: To investigate the insect pests which cause economic damage to the bast fibre during the production phase.

Approach: The agroclimatic zones suitable for the cultivation of fibres (Kenaf) - Hibiscus cannabinus, Urena lobata and (Jute) Corchorus olitorius and C. capsularis, have been demarcated by the Agronomist. Within these areas the major insect pests destructive to the crop have been surveyed and their potentiality assessed.

The biology and population dynamics of the insect pest are studied under field and laboratory conditions. The distribution of the insect pests and their alternative host plants are being investigated.

GHANA

Progress: A survey of the insect pest of (Kenaf), Hibiscus cannabinus and Urena lobata has been done and the insects identified. Studies on the biology of the major pest - Pedagrica spp. and Alcidodes sp. have been partially completed. The use of pesticides to control these pests was not found economic at the present production levels.

Preliminary work has been started on the insect pests of Corchorus spp. - a crop recently introduced for experimentation.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0135, INVESTIGATIONS INTO THE BIONOMICS AND CONTROL OF INSECT PESTS ON SUGAR CANE

G.K. BUAHIN, (GH.061.0009)

Objective: A sugar cane industry to cultivate about 20,000 acres has been started and 14,000 acres planted at Komenda and Asutsuare areas. The objective of this study is to identify the insect pest problems and attempt to find solutions to them.

Approach: 1. Insect population studies on fortnightly planted canes. At fortnightly intervals 1/10 acres of cane is planted. At weekly intervals after the 4th week the 50 shoot stalks are removed from each planting, split open and examined for insect infestation. 2. Insecticides have been screened for control of termites and stalk borers.

Progress: Bionomics: (a) There are two peaks of stemborer infestation on sugar cane. The first occurs in May/June and the second in September/October. The population for the second peak is about 2-3 times than for the first week. (b) Egg batches of Sesamia and Eldana have not been observed under natural field conditions but caged on young canes in the field; the females will oviposit into the leaf sheath. (c) Youngest shoots attacked by stemborers are about 5 weeks old but intense infestation occurs on plants 10 weeks old and older. (d) Maize is a more attractive crop to stem borers than sugarcane.

Control measures: (e) Aldrin 0.1% a.i. applied either as spray or dip for cane cuttings gave protection of planting material against termites. (f) Preliminary experiments on screening pesticides showed significant differences between Dieldrin, Gammalin, Didigam and Toxaphene/DDT in the control of stemborers on canes. Pest infestation was generally low during the season the experiment was performed.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0136, BIOLOGY AND CONTROL OF CEREAL STEM BORERS (LEPIDOPTERA)

G.K. BUAHIN, (GH.061.0010)

Objective: Reduction of crop loss due to damage by lepidopterous stem borers to cereal crops - maize, (Zea mays); rice, (Oryza sativa); sorghum, (Sorghum vulgare) and millet, (Pennisetum typhoideum).

Approach: 1. Survey and identification of lepidopterous caterpillars which cause damage to stems of gramminaceous crops by sampling plants in the three zones (forest, savannah woodland and savannah) of intensive cereal cultivation. 2. Studies on the population dynamics of the pests, the alternative host plants, parasites and predators. 3. Testing of pesticides and different formulations in liquid, dusts and granules.

Progress: 1. The important cereal stalk borers are species of Sesamia, Eldana, Busseola, Chilo. 2. Reduction in yield is greater during the second season crop (Aug. - January). 3. About 60 - 70% reduction in damage is achieved by spraying with DDT or Sevin or application of granules of Endrin 2%, Niran 10%G and PPS 51. The use of pesticides has several drawbacks including high cost and practicability due to low agronomic practice.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0137, EFFECTS OF FERTILIZER PLACEMENT ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS, CANNABINUS L.

S.Y. AMANQUAH, (GH.061.0011)

Objective: To determine the best methods of applying fertilizers to kenaf fields for high yields of dry fibre.

Approach: Four different methods of fertilizer application will be studied at Kwadaso Station. These include: (1) broadcast followed by incorporation into the soil, (2) broadcast without mixing with soil, (3) banding of fertilizers between rows on the surface, (4) banding of fertilizers between rows about 4 inches deep below the soil surface, (5) no fertilizer.

Design is 5 x 5 Latin Square. Plant height and stem diameter measurements will be taken at various stages of growth of the plant.

Progress: Banding of fertilizers between rows either on the soil surface or below the soil surface, gave taller stalks and a higher yield of dry retted fibre than broadcasting and no fertilizer.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0138, EFFECTS OF OPTIMUM TIME OF APPLYING FERTILIZERS ON THE GROWTH AND FIBRE YIELD OF KENAF, HISBISCUS, CANNABINUS AND URENA LOBATA

S.Y. AMANQUAH, (GH.061.0012)

Objectives: To determine the optimum time of applying fertilizers for a good yield of fibre.

Approach: There are 16 treatments consisting of full rate applied at planting and at 2,4,6 and 8 weeks after planting; split application with half applied at planting and the other half applied at 2,4,6 and 8 weeks after planting; a second split application with one-half applied at 2 weeks after planting and the other half at 4, 6 and 8 weeks after planting; a third split application with half applied at 4 weeks after planting and the other half at 6 and 8 weeks after planting; a fourth split application with half applied at 6 weeks after planting and the other half at 8 weeks after planting; and the control (no fertilizer).

Progress: The split application produced a higher yield of dry retted fibre than the full application, but the differences were too small to be important, considering the extra labour required for the second application.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0139, REPRODUCTIVE BIOLOGY OF KENAF

S.Y. AMANQUAH, (GH.061.0013)

Objective: The aim is to study floral morphology, and flowering periods, self-fertility, pollen viability, inheritance of floral response, and also flower and capsule distribution in kenaf.

Approach: Some kenaf varieties will be planted in the field and a detailed study of the flower and days of flowering will be made throughout the flowering period. The different types will be crossed. The f1 will be selfed. Backcrosses to both parents will be made. The parents F1, F2 and backcrosses will be planted in the field for studies. Pollen germination studies will also be done.

Progress: Self-fertility (per cent) of some kenaf varieties was found to vary from 33.3 to 79.2. Some of the results are still being processed.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0140, NATURAL CROSSING IN KENAF IN GHANA
S.Y. AMANQUAH, (GH.061.0014)

Objectives: The aim is to: 1. study natural crossing in kenaf, and 2. agents concerned with natural crossing in kenaf in Ghana.

Approach: 1. Plants with contrasting characters will be planted in alternate rows, as contiguous plants and at some distances from pollen source to determine the degree of natural crossing. 2. Some plants will be planted in insect-proof structures to determine the agents of natural crossing in kenaf.

Progress: 1. Wind is probably not an agent of natural crossing in kenaf. 2. Nomia Brachysoma, Aphis mellifica and Baris impolita which are constant visitors to kenaf flowers may be concerned with pollination in kenaf in Ghana. 3. Natural crossing occurs in kenaf in Ghana. When sown in alternate rows, the amount of natural crossing varied from 1.05 per cent to 11.01 per cent with a mean of 5.19 per cent. When sown as alternate plants in the same rows (contiguous plants), the amount of natural crossing was about 13.83 per cent.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0141, EFFECTS OF AGE AT HARVEST ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS, CANNABINUS, L.
S.Y. AMANQUAH, (GH.061.0015)

Objective: To determine the optimum age at which kenaf could be harvested for a yield of dry retted fibre.

Approach: 1. Kenaf will be planted in completely randomised blocks replicated four times. 2. Stalks will be harvested when the plants are 50, 70, 90, 110, 130, 150 and 170 days old for fibre yield.

Progress: Preliminary results indicate that for a high yield of fibre, kenaf could be harvested from 90 to 130 days after planting, depending on the variety.

Results appear in Crops Research Institute 1969, 1970 and 1971 Annual Progress Reports.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0142, EFFECTS OF CONDITIONS AND LENGTH OF STORAGE ON THE SEEDLING EMERGENCE OF KENAF, HIBISCUS, CANNABINUS, L.
S.Y. AMANQUAH, (GH.061.0016)

Objectives: To determine how long kenaf seeds can remain viable (germinable), when they are stored under the following conditions - atmospheric temperature and humidity, deep freezer, ordinary compartment of a refrigerator, cold room and an air-conditioned room.

Approach: 1. Kenaf seeds stored in sealed polythene bags and kept in the five different conditions will be sampled after certain periods of storage for germination studies. 2. The design will be completely randomized block replicated four times. 3. A seed will be considered emerged as soon as the plumule appears. 4. The data will be presented as total emergence, percentage emergence and rate of emergence.

Progress: Preliminary results indicate that both length of storage and conditions of storage affect seedling emergence of kenaf. Total percentage emergence and rate of emergence decreased from 74 days to 137 days of storage. While the rate at which percentage emergence decreased with time appeared to be slightly higher in seeds in an air-conditioned room, insect pest infestation was greater in seeds stored at room temperature and humidity.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0143, FERTILIZER TRIALS ON FLUE, FIRE AND AIR CURED TOBACCO
E.O. QUAO, (GH.061.0017)

Objective: To investigate the effects of increasing NPK fertilization on flue, fire and air cured tobacco in the particular areas of production.

Approach: Using the randomised block in a factorial design to observe the effects of higher levels of NPK applied by placement on flue, fire and air cured tobacco.

Progress: Current rates of NPK fertilization for farmers are 9 lbs N, 751 lbs P2O5, and 54 lbs K2O per acre by placement. Results of trials show that for air and fire cured tobacco, nitrogen could be increased up to 39 lbs/acre. For flue-cured tobacco increased above 20 lbs/acre presented curing problems. At 150 lbs/acre phosphate tended to depress yield. Increasing potash to 500 lbs/acre improved quality but its influence on income makes high potash fertilization unprofitable.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0144, AIR CURED TOBACCO VARIETY TRIAL
E.O. QUAO, (GH.061.0018)

Objective: To compare the performance of the following three air- cured varieties grown in the coastal savanna area: Virginia Hybrid, Garcia, and Burley.

Approach: Randomised block design was used to observe and compare yield and income from the three varieties.

Progress: Virginia Hybrid was consistently the best of the three. Burley was lowest in yield and income but had the best quality leaves.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0145, EFFECT OF TIME OF LAND PREPARATION AND PLANTING ON YIELD QUALITY OF FLUE CURED TOBACCO
E.O. QUAO, (GH.061.0019)

Objective: To investigate if time of land preparation and time of planting can influence yield and quality of flue cured tobacco.

Approach: Three planting dates are superimposed on land ploughed in December and again in March, and that ploughed only in March. Yield and income are assessed.

Progress: Early planting showed decisive influence on yield and income. Better cures were obtained from the early plantings. Average price per pound decreased with later plantings. Effects of ploughing in December and again in March were not strong enough.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0146, POSSIBLE SECOND SEASON CASH CROP FOR FLUE CURED TOBACCO FARMERS
E.O. QUAO, (GH.061.0020)

Objective: To find a sequence of crops for flue cured tobacco farmers with regard to economics and maintenance of soil fertility.

Approach: Four cash crops - maize, cowpea, sorghum, and groundnuts were planted after tobacco in a Latin square design. Income and soil fertility after harvest were assessed.

Progress: 1971 maize and groundnuts did well. Cowpea failed. Maize and sorghum would require additional fertilization. Residual effect of tobacco fertilizer was adequate for groundnuts. Leaching almost washed the soil clean of nitrogen.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

GHANA

3.0147, FIRE CURED TOBACCO VARIETY TRIAL

E.O. QUAO, (GH.061.0021)

Objectives: To compare the performance of the following eight fire-cured tobacco varieties with a view to recommending suitable ones to farmers: Ky 170, Ky 151, Ky 171, Ky 160, DF 300, Brown Leaf, Madole, and Black Mammoth.

Approach: Using randomized block design to observe and compare performance of each variety with the currently grown variety, Dark Heavy Western.

Progress: In 1971 Ky 151, Madole, Black Mammoth, and Ky 160 compared favourably in yield with Dark Heavy Western. In 1972 Madole and Black Mammoth enmerged superior to Dark Heavy Western with regard to yield and quality. Factory test reports are still awaited.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0148, TOBACCO SUCKER CONTROL WITH CHEMICALS

E.O. QUAO, (GH.061.0022)

Objective: To investigate the effectiveness and economics of using MH 30 and Off Shoot T to control suckers on tobacco.

Approach: Using randomized block to compare the performance of MH 30 and Off Shoot T with manual sucker control.

Progress: In 1971 both MH 30 and Off Shoot T effectively controlled suckers. Yield on plots where suckers were chemically controlled were higher than manually controlled plots. Average price per pound was higher on manually controlled plots.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0149, TOMATO VARIETY TRIAL

F. AGBLE, (GH.061.0023)

Objective: To find out which tomato variety yields best at the station (Forest-Savannah Mosaic Zone).

Approach: 10 cultivars planted for 2 seasons on randomized block with 6 replications under rain fed condition. The cultivars are: 1. C.P.C. 2; 2. Marglobe Select; 3. VFN 6427; 4. Hotest; 5. Indian River; 6. Mecheast 22; 7. VF. 198-69; 8. Gemed F; 9. Eilon F; 10. M/H6/1.

Progress: Of the 10 cultivars so far only one is yielding below 5 tons/acre. The other cultivars are yielding between 10 to 15 ton/acres. The work is still in progress.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0150, TOMATO BREEDING

F. AGBLE, (GH.061.0024)

Objective: To develop suitable tomato cultivars for processing. Cultivars to be high yielding, disease resistant as much as possible, and to have good fruit qualities.

Approach: Crossing local cultivars with introduced varieties followed by selection at different generations. Use of colchicine to produce polyploidy. Use of cobalt 60 source of irradiation to induce polyploidy if possible.

Progress: The work is still in progress and no specific results have been obtained as such.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0151, TOMATO - COWPEA ROTATION

F. AGBLE, (GH.061.0025)

Objective: To find a suitable rotation crop for tomato to avoid building up nematode population in the plot.

Approach: Every tomato crop is followed by cowpea cropping. The cowpea is harvested and the vines ploughed back into the soil. The plot is allowed to fallow for at least two months before tomato cropping.

Progress: Results so far obtaind indicates that cowpeas are a good rotation crop.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0152, THE PRODUCTION OF HIGH YIELDING VARIETIES OF GROUNDNUTS

H. MERCERQUARSHIE , (GH.061.0026)

Objectives: To develop high yielding varieties of groundnuts with high oil content for the oil trade and large seeded varieties with low oil content for the confectionery trade.

Approach: Varietal selection. Planting at close spacing to ensure increased yield per unit area, weed and rosette control.

Progress: Out of 137 cultivars screened, 40 gave calculated yields ranging from 1158 - 2316 lbs per acre (shelled). Heavy yielders are being multiplied for release to farmers.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0153, COWPEA INVESTIGATION

H. MERCERQUARSHIE , (GH.061.0027)

Objective: To select high yielding, palatable varieties of cowpeas for commercial cultivation in Ghana and investigate the agronomic techniques which are necessary to obtain high yields.

Approach: Investigating to choose between the major and the minor seasons of planting, different rates of fertilizer applications. Selection for heavy yielding, early maturing (non-heavy growth), and resistance to diseases and pests.

Progress: Remarkable yields of 659-3205 lbs/acre have resulted from 29 varieties selected from 50 varieties after a screening. Many high yielding varieties, are available which are superior to the small seeded reddish brown local variety which does not yield over 200 lbs/acre.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0154, SUGARCANE AGRONOMIC INVESTIGATIONS

H. MERCERQUARSHIE , (GH.061.0028)

Objective: To select early, medium, and late maturing varieties with a high tonnage of sugar per acre coupled with resistance to disease and pests, and possessing the required agronomic characters.

Approach: Spacing investigation. Different rates of fertilizer application. Irrigation verses non irrigation for optimum age with maximum sugar yield per acre. Selection for varieties with resistance to diseases and pests. Sugar production.

Progress: Irrigation has shown increased yield of millable stalks by 27% over non irrigation. Five major varieties have yielded as high as 40.6 - 52.4 tons/acre of millable stalks and 4.3 - 6.8 tons/acre of sugar.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0155, CASSAVA IMPROVEMENT

H. MERCERQUARSHIE , (GH.061.0029)

Objective: To select varieties of a high yield of palatable tubers combined with high resistance to cassava mosaic virus disease. Determine desirable cultural treatments.

Appoach: Varietal selection. Cultural studies with spacings of cultivars. Different rates of fertilizer application. Correct time of planting and optimum maturing age.

Progress: 86 cultivars tested at Kwadaso with and without fertilizers produced the following yields: 23 cultivars without fertilizers yielded 15-35 tons/acre (calculated); 45 cultivars with $ fertilizers yielded 15-41 tons/acre (calculated).

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0156, SORGHUM INVESTIGATION IN THE TROPICAL FOREST ZONE

H. MERCERQUARSHIE, (GH.061.0030)

Objective: To determine the possibility of sorghum cultivation in Ashanti Region mainly for livestock feed and manufacture of local (pito) beer.

Approach: Different spacing and time of planting. Selection for high yielding varieties. Selection against the following. Late maturing. Lodging. Varieties that are susceptible to diseases and pests.

Progress: Dwarf white milo, Dwarf Feterita 7028, Dwarf Hegari and 27 others from U.S.A. have under 2' x 8' or 12" spacings with high dressing of N x P fertilizer in the major season, yielded from 1000 to 10538 lbs per acre (calculated) and with economic yields under 2' x 1' spacing in the minor season.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0157, TO DETERMINE WHETHER WHEAT COULD BE SUCCESSFULLY CULTIVATED IN GHANA

H. MERCERQUARSHIE, (GH.061.0031)

Objective: To conduct preliminary investigations to determine whether wheat could be successfully cultivated in Ghana.

Approach: Different spacings and time of planting. Selection for high yielding varieties with qualities for early maturing, non-shattering heads, non-lodging and disease free.

Progress: Varietal trials have shown remarkable yields between 800 1000 lbs/acre.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0158, SESAME INVESTIGATION

H. MERCERQUARSHIE, (GH.061.0032)

Objective: To determine whether sesame could be successfully cultivated in Ghana as another source of oil and for other purposes.

Approach: Time of planting. Spacing. Fertilizer rates. Selection for high yielding varieties.

Progress: Kwadaso trial investigations have confirmed those at Bunso that sesame can be successfully cultivated in Ghana with good yields of 800-1000 lbs/acre in the major season and economic yields in the minor season.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0159, COLLECTION AND CLASSIFICATION OF YAM CULTIVARS

A.H. OPPONG, (GH.061.0033)

Objective: To establish a classification of yams based on morphological, anatomical, genetic and growth characteristics.

Approach: Farms in yam growing centres in the various regions of the country to be visited, and the characteristics of yam varieties under cultivation to be briefly recorded. "Seeds" of these varieties to be collected. An exchange programme has been initiated to collect cultivars from other tropical countries. The collections will be maintained in museums in the three typical agroclimatic zones of Ghana.

Progress: Eighty-seven cultivars, belonging to the 4 species:- Dioscorea rotundata (64 cultivars), D. alata (15 cultivars), D. cayenensis (5 cultivars), and D. dumentorum (3 cultivars), have been collected. These have been planted at 3 stations: Nyankpala (Sudan savanna), Ejura (Savanna woodland), and Kwadaso (Forest) - where their growth characteristics, anatomy, cytology and biochemical composition are being studied.

In addition to the indigenous material, 9 cultivars have been received from Puerto Rico. These are being multiplied at Kwadaso.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0160, CYTOLOGY OF YAMS

A.H. OPPONG, (GH.061.0034)

Objective: The aim is to study the cytological differences between the different yam varieties to provide a basis for selection and future breeding work.

Approach: Vine cuttings from various cultivars are cultured in tap water to root. The root tips are then removed for cytological studies. Techniques for slide preparations are being tested.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0161, MAIZE IMPROVEMENT THROUGH BREEDING

M.K. AKPOSOE, (GH.061.0035)

Objective: To develop high yielding, lodging resistant, high protein maize varieties.

Approach: 1. Population improvement involving developing broad genetic base composites as starting material. Breeding methods using recurrent selection, mass selection and S1 selection, exploiting additive genetic variance of population. 2. Incorporating opaque-2 gene and brachytic-2 gene by backcrossing methods to develop high lysine/tryptophan and lodging resistance into elite varieties.

Progress: 1. Two composite varieties (a) Golden Crystal and (b) Composite-4 having high yield potentials have been developed and released. 2. A lodging resistant population based on the brachytic-2 gene has been established. 3. A high lysine/tryptophan population is in the final stage of evaluation. 4. Early mauturing yellow endosperm composite variety has been developed especially for the minor season and regions of low rainfall.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0162, INFLUENCE OF COTORAN AND PLANAVIN HERBICIDES ON THE YIELD OF COTTON

S.E. KOLI, (GH.061.0036)

Objective: To determine which of the two herbicides is effective for weed control in cotton fields.

Approach: Various concentrations of the herbicides applied; and weed-free periods for the various treatments recorded.

Progress: Cotoran more effective than planavin. Cotoran applied at 0.75 - 1.50 lbs/acre active ingredient controlled weeds for 42 days and 2.0 and -2.5 lbs/acre active ingredient kept plots weed-free for 52 days.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0163, NITROGEN EFFECT ON GROUNDNUT YIELD

S.E. KOLI, (GH.061.0037)

Objective: To assess response of groundnuts to nitrogen fertilizer.

Approach: 4 levels of nitrogen with application of basal P and K.

Progress: Nothing is gained by applying nitrogen fertilizer to groundnuts. 10 lbs/acre nitrogen as starter fertilizer may be beneficial.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0164, EFFECT OF DIFFERENT LEVELS OF NPK ON THE YIELD OF YAM

S.E. KOLI, (GH.061.0038)

Objective: To determine fertilizer requirements of yam in northern Ghana.

Approach: 3 x 3 x 3 NPK factorial - first year. Then more emphasis on nitrogen levels.

Progress: Nitrogen most limiting. Phosphorus slightly increased yield. Potassium not important.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0165, EFFECT OF LOCAL FARMER'S PRACTICE OF STEPPING ON GROUNDNUTS

S.E. KOLI, (GH.061.0039)

Objective: To determine whether there is any merit in the local farmer's practice of stepping on groundnuts prior to pod formation with the belief that some of the aerial roots will be forced into the soil to develop into pods.

Approach: Stepping compared with no stepping.

Progress: Stepping on groundnut with the hope of forcing the gynophores into the ground does not increase yield.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0166, SPACING ON 4 COWPEA VARIETIES

S.E. KOLI, (GH.061.0040)

Objective: To find spacing at which each of the varieties performs best.

Approach: 4 spacing and 4 varieties in all combinations.

Progress: First year's trial just harvested.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0167, COMPARISON OF COW MANURE, POULTRY MANURE AND CHEMICAL FERTILIZER ON MAIZE YIELD

S.E. KOLI, (GH.061.0041)

Objective: To determine the effect of the manures and chemical fertilizer and then combinations, on soil and maize yield.

Approach: Randomised block design. Treatments applied on same plots each season.

Progress: First year's trial not yet completed.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0168, COMPARISON OF MONOCROPPING AND INTERCROPPING OF SOME FIELD CROPS

S.E. KOLI, (GH.061.0042)

Objective: To compare monocropping and intercropping to know the best system for growing some crops.

Approach: 4 treatments -- 1. Monocropping; 2. Inter-row intercropping; 3. Inter-hole intercropping; 4. Inter-row intercropping with closer hill spacings.

Progress: Monocropping yield higher in maize/groundnut, and barley millet/ sorghum but intercropping gave higher cash return in maize/ sorghum.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0169, RATE AND TIME OF NITROGEN APPLICATION ON MAIZE, YAM AND RICE

S.E. KOLI, (GH.061.0043)

Objective: To locate best time to apply nitrogen and the best dosage.

Approach: 3 nitrogen levels with 5 times of nitrogen application subtreatments.

Progress: Results indicate that time and rate of nitrogen application affects yields significantly.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0170, VARIETAL IMPROVEMENT OF UPLAND RICE

J.E. QUANSAH, (GH.061.0044)

Objective: Improvement of the grain yielding capability of two rice varieties.

Approach: Pure line selection within two early maturing rainfed rice varieties, C2 and C18.

Progress: First cycle of selection effected.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0171, FERTILIZATION OF SMOOTH CAYENNE PINEAPPLE IN GHANA

W.S. ABUTIATE, (GH.061.0045)

Objective: To determine the fertilizer requirements of the smooth cayenne pineapple in the major growing areas of Ghana.

Approach: The project involves the siting and laying down of replicated randomised block design trials to determine the application rates, schedules, methods of application and forms of fertilizer best suited for use in the growing areas, effect of fertiliser on yield and fruit quality as determined by % total soluble solids and 1% acidity. To achieve the above objective some fertilizer trials have been laid down in the forest and coastal savannah growing areas. Cultural improvement methods have been incorporated in some of the trials. Experiments currently in progress include: 1. Effects of plant density, nitrogen levels and growth hormone on the yield and quality of smooth cayenne pineapple in the forest zone of Ghana. 2. Effects of increasing levels of N and K in combination with magnesium on the yield and quality of smooth cayenne pineapple in the forest zone of Ghana. 3. Effects of various levels of NPK fertilizer on the growth, yield and fruit quality of smooth cayenne pineapple in the coastal savannah zone of Ghana.

Progress: The results of a preliminary trial on the responses of smooth cayenne pineapple to nitrogen, phosphorus and potassium conducted in the forest zone have showed that yield and mean fruit weight responded significantly to nitrogen and potassium application. Phosphorous depressed yield. Nitrogen addition reduced while potassium addition raised the TSS of the juice. There was significant NP interaction on the acid content of the juice.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0172, EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.061.0046)

Objectives: To determine the optimum level of nitrogen which could give high yield of dry retted fibre.

Approach: 1. The experiments will be sited in the Forest zone, Forest-Savannah Transition zone, Northern Savannah zone and Southern Savannah zone. 2. Nigrogen will be applied to kenaf plots at the following rates; (lbs/acre): (a) 0; (b) 30; (c) 60; (d) 90; (e) 120; (f) 150. Each plot also will receive 60 lbs./acre phosphorous

and 60 lbs/acre potassium. Plot (g) will receive 150 lbs/acre of nitrogen, 60 lbs/acre phosphorus, and 120 lbs/acre potassium. 3. Kenaf seeds will be planted in completely randomised blocks replicated six times and plant height and stem diameter measurements will be taken at 50, 70, 90 and 110 days after planting. Yield of fresh green stalks and dry retted fibre will be recorded.

Progress: Preliminary results are being analysed statistically.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0173, EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.061.0047)

Objective: To determine the best combinations and levels of nitrogen, phosphate and potash as sulphate of ammonia, single superphosphate and muriate of potash, respectively, which can give high yield of dry retted fibre and seed.

Approach: 1. The experiments are sited in the different ecological zones of Ghana. 2. The treatments are 0, 30 and 60 lb per acre sulphate of ammonia, single superphosphate and muriate of potash respectively in a 3 x 3 x 3 factorial arrangement. 3. The design is completely randomised blocks with four replications. 4. The fertilizers are mixed and applied between the rows on surface 14 days after planting. 5. Records on plant height, stem diameter, yield of fresh green stalks, and yield of dry fibre are taken.

Progress: The results of the experiments indicated that for a high yield of dry retted fibre, the best combinations of NPK which could be used are the following: 30:30:30: or 60:30:30 for the forest zone; 60:60:60 or 60:60:30 for the Northern Savannah zone and 60:60:30 or 60:60:60 for the Southern Savannah zone. The application of 30 lbs/acre of potash increased seed yield at Kwadaso.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0174, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.061.0048)

Objectives: To determine the optimum date of planting kenaf for high yield of fibre.

Approach: 1. The experiments will be sited in the different ecological zones of Ghana. The experiments will be laid out in randomised blocks with six replications. 2. Planting will be done at fortnightly intervals from March to July. 3. Plant height and stem diameter measurements will be taken at 50, 70, 90 and 120 days after planting and at maturity. 4. Plant height will be measured from the ground level to the growing point of each plant. 5. Stem diameter will be taken at a point 12 inches from the ground level. 6. Other data to be taken are fresh green weight of plant, dry fibre weight and fibre per cent.

Progress: Results indicate that for fibre production, kenaf must be planted during the main rainy season with the start of the rains. Planting could be done from March to early May in the Forest zone, Forest-Savannah Transition zone and the Southern Savannah Zone. In the North, planting may be done in May and June. For seed production, planting could be done in the South in September/October.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0175, DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE

S.Y. AMANQUAH, (GH.061.0049)

Objectives: To develop varieties of kenaf with desirable agronomic characteristics for commercial fibre production.

Approach: The studies involve: 1. Introduction of kenaf from different countries. 2. Collection of seed of cultivated and wild types from different parts of Ghana. 3. The introduced and local types will be observed for fibre yield disease and nematode resistance. 4. Other aspects of these studies will involve: (a) comparison of the fibre yield of the different varieties in the different ecological zones of Ghana (b) development of pure-lines through selfing and selection, (c) hybridization to combine desirable characteristics, (d) testing.

Progress: 1. One variety A63-440 was released to the Bast Fibres Development Board in 1971 for commercial fibre production. 2. Eight different types have been isolated from the composite variety "Ghana Mixed". A paper is being prepared for publication. 3. Two photo- insensitive strains have been selected for further studies.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0176, INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS

E.A. ADDISON, (GH.061.0050)

Objective: To determine the effectiveness of fungicidal seed-dressing in controlling soil-borne pathogens responsible for pre-emergence and post-emergence delay and damping-off.

Approach: Selected fungicides are used in dressing seeds before sowing. Seedlings showing symptoms of post-emergence damping-off and seeds which fail to germinate are collected and examined in the laboratory. Emergence and establishment counts are taken on the 14th and 28th days after sowing.

Progress: The crops which have been studied to date are maize at Kwadaso, Ohawu and Ejura, and millet and maize at Nyankpala. Chemical treatment of the seed, especially with Dieldrex A and mergamma A, has been found to be beneficial and has resulted in considerable increase in yield, especially at Nyankpala. Other important economic crops will be taken up.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0177, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA

S.Y. AMANQUAH, (GH.061.0051)

Objectives: To determine the optimum dates on which Urena lobata could be planted for a high yield of fibre.

Approach: 1. Urena lobata will be planted at two weekly intervals in the different ecological zones of Ghana from March to July. 2. The experiments will be laid out in completely randomised blocks with six replications. 3. Plant height and stem diameter measurements will be recorded when the plants are 50, 70, 110 and 130 days old. 4. Stalks will be harvested for yield of fresh green stalks and dry retted fiber.

Progress: Results indicate that planting may be done in the Forest zone in March/April, Forest-Savannah Transition zone in April, Northern Savannah zone in May/June and probably early July and at Ohawu, Southern Savannah zone from the second half of March to the second week in May.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

GHANA

3.0178, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS, CAPSULARIS

S.Y. AMANQUAH, (GH.061.0052)

Objective: To determine the optimum dates of planting jute, Corchorus, capsularis for a high yield of fibre, in the different ecological zones of Ghana.

Approach: 1. Jute, Corchorus, capsularis, will be planted at two weekly intervals starting from the onset of the rains, in completely randomised blocks replicated six times. 2. Data to be taken will include plant height, stem diameter, yield of fresh green stalks and dry retted fibre.

Progress: Preliminary results indicate that Corchorus, capsularis could be planted at Kwadas, Forest zone, from March to April. At Nyankpala, in the Northern Savannah zone, jute could be planted for fibre in May/June. Generally, early planting with the start of the rains is preferable to late planting.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

MANGA SUBSTATION

Manga

3.0179, DEVELOPMENT OF MEDIUM MATURING, SHORT STATURE, HIGH YIELDING SORGHUM VARIETIES OF ACCEPTABLE PALATABILITY AND RESISTANT TO PESTS & DISEASE

H. MERCERQUARSHIE, (GH.066.0001)

Objective: High yielding, short stature sorghum having the same maturing period as local types in the Sudan Savanna Zone of Ghana and with a semi-compact panicle bearing flinty grains and resistant to Smuts, Striga and Sorghum Midge.

Approach: Introduction of early maturing, short stature sorghum with high yield potential. Screening of these for pests and disease resistance. Yield trial of local varieties to select top yielders. Crossing of selected early maturing, short stature types with selected tall, medium maturing ones. Selection from segregating populations of desirable short stature, medium maturing types.

Progress: A sorghum selection, Naga White, of medium stature (7ft.) and medium maturity (80 days to flowering when planted in June) yielding 2600 lbs/ac on the average, which is 80 percent higher than the yield of the best local variety, has been recommended. Many more lines resulting from crosses have been carried to F5 generation, and are being yield tested for those still higher yielding than Naga White to be recommended.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0180, THE DEVELOPMENT OF EARLY MATURING, HIGH YIELDING, PALATABLE VARIETIES OF PENNISETUM MILLET RESISTANT TO DISEASES, PESTS AND LODGING

H. MERCERQUARSHIE, (GH.066.0002)

Objective: An early maturing, disease and pest resistant, thick and long headed, highly tillering, high yielding crop.

Approach: Collection and evaluation of varieties in Ghana to see if enough variation exists. Introduction of varieties from other sources to improve genetic base material in Ghana and evaluation of these to see if any could be recommended over and above the existing ones. Formation of composite with local collections and introductions.

Recurrent selection on composite to improve yield while bearing in mind other objectives.

Progress: One composite from crosses of only Ghanaian and Nigerian material yielding 20 percent higher than an earlier recommendation was recommended in 1969. A composite containing genes from many more countries and selection only once showed an increase in yield to 1002 lbs/ac from a yield of the previous year of 876 lb/ac.

Its genetic variation as measured from genetic co-efficient of variation had been reduced from 32 percent to 14 percent.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0181, STUDIES OF OPTIMUM PLANTING DATES OF FIELD CROPS

S.E. KOLI, (GH.066.0003)

Network project: See GH. 064.0011. (3.0192)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

NYANKPALA AGRICULTURAL EXPERIMENTAL STATION

P.O. Box 54, Nyankpala via Tamale

3.0182, INVESTIGATION OF OPTIMUM PLANTING DATE FOR COTTON

S.E. KOLI, (GH.064.0001)

Objective: To determine the effect of planting date on mean yield of seed cotton.

Approach: Cotton variety, Allen 333, was used in a randomised complete block of five replicates. Plot size was 30' x 12' of 4 rows with the two middle rows (190 sq.ft.) harvested for yields. Planting commenced in late May at fortnightly intervals through the middle of July (five plantings).

Progress: Results obtained have been following the same trend every year. Early planting gave highly significant results (at 1 percent level). June planting therefore appeared to be the best time for sowing cotton at the ecological sites (Damongo and Nyankpala).

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0183, THE DEVELOPMENT OF LATE MATURING, HIGH YIELDING, PALATABLE VARIETIES OF MILLET (PENNISETUM) RESISTANT TO DISEASES, PESTS AND LODGING

H. MERCERQUARSHIE, (GH.064.0002)

Objective: A late maturing, disease and pest resistant, thick and long headed, highly tillering, high yielding crop.

Approach: Collection and evaluation of varieties in Ghana to see if enough variation exists. Introduction of varieties from other sources to improve the genetic base of material in Ghana and evaluation of these to see if any could be recommended over and above the existing ones. Formation of composite with local collection and introductions. Recurrent selection of composite to improve yield while bearing in mind other objectives.

Progress: No introduction has been superior in yield to local types. Varieties maturing earlier than local ones have generally

been poor in yield. One cycle of selection on the late millet composite resulted in an increase in yield of 5.2 percent. However, the genetic variation of the composite as measured from genetic coefficient of variation was reduced from 29.7 percent to 12.4 percent.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0184, THE DEVELOPMENT OF LATE MATURING, SHORT VARIETIES OF ACCEPTABLE PALATABILITY & RESISTANT TO PESTS & DISEASE

H. MERCERQUARSHIE, (GH.064.0003)

Objective: High yielding, short stature sorghum having the same maturity period as local types and with a semi-compact panicle bearing flinty grains and resistant to Smuts, Striga and Sorghum Midge.

Approach: Introduction of early maturing, short stature varieties with high yield potential screening of these for pests and disease resistance. Yield trial of tall, late maturing local varieties to select top yielders. Crossing of selected early maturing, short stature types, with selected tall, late maturing ones. Selection from segregating populations of desirable short stature, late maturing types.

Progress: A selection of medium stature (7 ft) but late in maturity (110 days to flowering when planted in June) with an average yield of 1500 lbs/ac has been recommended. Eighty one desirable lines from crosses of tall X short varieties have been carried to the F5 generation. Some have been back crossed to the shorter parents and the resulting segregates are undergoing yield testing.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0185, THE INTRODUCTION AND SELECTION OF HIGH YIELDING VARIETIES OF GROUNDNUTS PROCESSING HIGH OIL CONTENT FOR NORTHERN GHANA

H. MERCERQUARSHIE, (GH.064.0004)

Objective: Maturity period 120-140 days. High kernel yield. High oil content. Disease and pest resistance. Variety with dormancy and good pod retention at digging.

Approach: Collection of local varieties and introduction of more varieties from outside. Screening of these for all objectives except yield and oil content. Varieties found suitable from the screening test go into a yield trial for two or more years on a number of locations. Oil content of the few top yielders are determined. Varieties possessing the highest oil yield for the different locations are then recommended to farmers. Recommended varieties are then mass selected to further improve them.

Progress: In the screening exercise it appeared early maturing varieties (less than 100 days) were more susceptible to cercospora leaf spot and rosette than the late maturing ones (120 days or more).

Field trials have indicated Mani Pintar to be the best variety in the Northern Region and Tirik to be the best in the Upper Region. One year of mass selection within Mani Pinter resulted in an increased yield of 5-8 percent in trials comparing selected and unselected Mani Pintar in 3 locations.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0186, INVESTIGATION INTO FERTILIZER LEVELS FOR UPLAND RICE

J.E. QUANSAH, (GH.064.0005)

Objective: Test for interactions between variety, fertilizer level and location.

Approach: Scatter block technique. Split plot design with varieties, IR.20, C21, 617A and C4 - 63 as main plots and sixteen fertilizer levels as sub-plots and replicated three times.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0187, TIME OF NITROGEN TOP DRESSING OF UPLAND RICE

J.E. QUANSAH, (GH.064.0006)

Objective: Determination of the most suitable growth stage of the rice crop at which to top-dress.

Approach: Split plot experiment with four replicates and four varieties as main plots and the following fertilizer regimes as sub-plots. 1. 100 percent N at planting. 2. 50 percent N at planting and 50 percent N at maximum tillering. 3. 50 percent N at planting and 50 percent N at booting. 4. 0 percent at planting and 100 percent N at maximum tillering. 5. No N as control.

Progress: Top-dressing appears to be most beneficial at maximum tillering stage.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0188, WEED CONTROL OF UPLAND RICE

J.E. QUANSAH, (GH.064.0007)

Objective: Screening of herbicides.

Approach: Split plot experiment with four replicates and four herbicides, stam F34, TOK E25, Amiben-P.C.D. and Natchett as main plots and levels as sub-plots.

Progress: Natchett applied at 4kg/ha one day after sowing appears most promising.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0189, IMPROVEMENT OF GRAIN - STRAW WEIGHT RATIOS OF UPLAND RICE

J.E. QUANSAH, (GH.064.0008)

Objective: Maximisation of grain: Straw weight ratios of two rainfed rice varieties 617A and C21.

Approach: Backcross technique.

Progress: Initial cross effected.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0190, DETERMINATION OF THE RESPONSE OF COTTON TO N, P, K 3X3X3 FERTILIZER LEVELS

S.E. KOLI, (GH.064.0009)

Objective: To find out a fertilizer dosage for cotton.

Approach: NPK was mixed in 27 treatment combinations at (N-0, N- 40, N-80) x (P-0, P-50, P-100) x (K-0, K-20, K-40) lbs per acre. The plot size was 30' x 12' of 4 rows with the two middle rows (180 sq.ft.) harvested for yields. Ammonium sulphate was used for N. Single superphosphate for P and muriate of potash for K.

Progress: Results obtained so far showed that nitrogen fertilizer (ammonium sulphate) increased yield significantly (5 percent level), by 185 lbs per acre seed cotton and almost significant at 1 percent level. P2O5 and K2O have not yet responded significantly to treatment.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0191, POPULATION AND FERTILIZER STUDIES ON CEREALS

S.E. KOLI, (GH.064.0010)

Objective: To determine the effects of spacing and fertilizer on the yield of cereals.

Approach: Spacing tested were: 1' x 1', 2' x 6", 2' x 1', 2' x 2', 3' x 6" and 3' x 1' Fertilizer levels were: 48 lbs/acre each of N, P2O5 and 20 lbs. of K2O; (F2) twice the above.

Progress: Maize: Results showed highly significant differences between spacing means, fertilizer means and the interactions between the two were significant. Fertilizer use up to F1 level is recommended. Spacings 2' x 1', 1' x 1', and 3' x 6" gave highest yields at F1 level. However 2' x 1' spacing is to be recommended at F1 level.

Sorghum: Results have indicated that 3' x 6", 2' x 1' and 1' x 1' plant per hill are optimum and fertilizer application of 40-50 lbs/acre each of N, P2O5 and 20-30 lbs/acre of K2O are adequate in achieving good yields. Significant interaction between spacing is listed.

Early Millet: Results have shown that 3' x 6", 1' x 1' and 2' x 1' spacings give highest yields. The recommended spacing of 3' x 1' gave lower yields and should be discouraged.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0192, STUDIES OF OPTIMUM PLANTING DATES OF FIELD CROPS

S.E. KOLI, (GH.064.0011)

Objective: To determine the optimum planting dates for maize, sorghum, millet, rice, groundnuts, cowpeas and yams.

Approach: Trials laid out on randomised complete block design with five replications. Treatments were five for each crop and effected at fortnightly intervals starting at beginning of cropping season. Recommended fertilizer rates and spacings for each crop employed.

Progress: May to early June planting recommended for maize in Northern Region. Sorghum, late millet - late May to June planting recommended for Northern and Upper Regions. May and June respectively, planting advisable in both regions for groundnuts. Planting early millet in early May in Upper Region advisable. Planting rice from June to mid-July best and late May to late June advisable in Nothern and Upper Regions respectively. Planting yams prior to onset of major rains recommended. Yields indicate planting cowpeas from late June to July is to be recommended.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0193, EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HISBICUS CANNABINUS L.

S.Y. AMANQUAH, (GH.064.0012)

Network project: See GH.061.0046. (3.0172)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0194, EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.064.0013)

Network project: See GH.061.0047. (3.0173)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0195, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.064.0014)

Network project: See GH. 061.0048. (3.0174)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0196, DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE

S.Y. AMANQUAH, (GH.064.0015)

Network project: See GH.061.0049. (3.0175)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0197, INVESTIGATIONS OF FUNGICIDAL SEED DRESSING

E.A. ADDISON, (GH.064.0016)

Network project: See GH. 061.0050. (3.0176)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0198, EFFECTS OF DIFFERENT DATE OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA

S.Y. AMANQUAH, (GH.064.0017)

National Network project: See GH. 061.0051. (3.0177)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0199, EFFECTS OF DIFFERENT DATES OF PLANTING OF THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS, CAPSULARIS

S.Y. AMANQUAH, (GH.064.0018)

Network project: See GH. 061.0052. (3.0178)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

OHAWU AGRICULTURAL EXPERIMENTAL STATION

P.O.B., Ohawu

3.0200, CROPS SEQUENCE TRIAL

A.F. KISSIEDU, (GH.065.0001)

Objective: To determine optimum crop succession in a rotational system of farming.

Approach: 7 x 7 Latin square replicated 3 times. Plot size 1/40 of an acre. Seven treatments - (1) maize/falow; (2) cassava; (3) tobacco/ fallow; (4) maize/cowpea; (5) fallow/fallow; (6) cowpea/cowpea (7) maize/maize. 1st year: Each of 3 blocks divided into 7 plots (7/40 acre) so that each block contains all 7 treatments. 2nd year: Each 1st year plot is sub-divided into 1/40 acre plots each undergoing for one treatment. 3rd year: The whole field put under test crops. Characteristic to be measured: crop yield/-plot, disease, pest resistance, input/output ratio.

Progress: Assessment of the trial can only be drawn after the test crop in the third year.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0201, EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.

S.Y. AMANQUAH, (GH.065.0002)

Network project: See GH.061.0046. (3.0172)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0202, EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH FIBRE AND SEED YIELDS OF KENAF, HIBISCUS CANNABINUS L.
S.Y. AMANQUAH, (GH.065.0003)
Network project: See GH. 061.0047. (3.0173)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0203, EFFECTS OF DIFFERENT DATES OF PLANNING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L.
S.Y. AMANQUAH, (GH.065.0004)
Network project: See GH. 061.0048. (3.0174)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0204, DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE
S.Y. AMANQUAH, (GH.065.0005)
Network project: See GH. 061.0049. (3.0175)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0205, INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS
E.A. ADDISON, (GH.065.0006)
Network project: See GH. 061.0050. (3.0176)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0206, EFFECT OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA
S.Y. AMANQUAH, (GH.065.0007)
Network project: See GH. 061.0051. (3.0177)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0207, EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CARCHORUS, CAPSULARIS
S.Y. AMANQUAH, (GH.065.0008)
Network project: See GH. 061.0052. (3.0178)

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

PLANT INTRODUCTION AND EXPLORATION SECTION

Bunso - Bosuso - P P B, Bunso - Bosuso

3.0208, INTRODUCTION OF EXOTIC PLANTS
M.A. ADANSI, (GH.063.0001)

Objectives: (a) To provide a basis for crop improvement and diversification. (b) To obtain from foreign countries crop plants deserving priority attention for programmes in pathology, genetics, agronomy, horticulture, etc. (c) To multiply introductions for distribution after preliminary evaluations. (d) To prepare plant inventories of introductions with economic potential.

Approach: (a) By written requests to known sources for plant materials to be supplied gratis, on payment or exchange basis. (b) Introductions are planted for observation and multiplication after phytosanitary precautions. (c) Evaluation is on the basis of adaptation to local conditions, growth measurements, phenology, yield, disease and pest resistance etc.

Progress: Over 800 introductions have been made to date from the U.S.A., India, Australia, S. America, China, Israel, Philippines, Hawaii and many other countries. These include Malayan Dwarf Coconuts from Jamaica and the Ivory Coast for testing against the Cape St. Paul wilt disease of coconuts, commercial mango and avocado, rice, sesame, soyabean, citrus rootstocks, wheat etc. The greatest difficulty, however, is lack of proper storage facilities.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0209, PLANT EXPLORATION AND COLLECTION
M.A. ADANSI, (GH.063.0002)

Objective: (a) To help conserve germ plasm. (b) To participate in FAO world-wide plant material exchange programme.

Approach: By exploration and collection expeditions, direct purchases from local markets and exhibitions at agricultural shows in various regions. Emphasis is on: (a) Primitive material used in agriculture and related wild species; (b) new plants with economic potential; (c) special stocks including lines with known genetic factors or species cytological characteristics, resistant types, obsolete cultivars and mutants.

Progress: Progress has been slow due to inadequate findings. There have been no exploration expeditions to date, but over 300 collections have been made to meet foreign plant material requests.

Interesting collections of indigenous plants with sweetening principles or taste-modifying properties are currently receiving international attention as potential substitutes for sugar and cyclamate.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

POKOASE FOOD STORAGE SECTION

Pokoase

3.0210, INSECT INFESTATION AND DAMAGE OF MAIZE AND COWPEAS ON SALE ON SOME MARKETS IN GHANA
A. OFOSU, (GH.069.0001)

Objective: To collect general information on (a) the types of insects infesting maize and cowpeas, (b) price fluctuations, (c) purity of the maize and cowpeas, (d) moisture content, and (e) magnitude of losses on the markets.

Approach: 3 standard measures are purchased weekly from each market on market days and examined in the laboratory.

Progress: Information on types of insects, price fluctuations, and moisture content of maize on 4 markets has been obtained.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0211, THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS
A. OFOSU, (GH.069.0002)

Objective: To reduce infestation and losses during the storage of maize on the cob in farmers' cribs.

Approach: Insecticides that can be applied directly to maize grains are first tested in the laboratory using Sitophilus zeamais (Motsch) and Tribolium castaneum (Herbst) as test insects.

Selected insecticides are then sprayed on maize in cribs. Percentage weight loss, number of insect exit holes per 100 maize grains and number of insects present in a subsample are the parameters for assessing the effectivensss of an insecticide.

Progress: A method for controlling insects and rodents attacking maize in cribs using ethylene dibromide and rat baffles has been recommended and is in use by farmers in the country (1).

Malathion, (dust and concentrate), pyrethrins in odourless oil (2,3), sevin and agrothion (4) have been found to give control of storage insects for periods up to 3 months.

Bromophos (5), Nuvan 7 (dichlorvos) and "Actellic" (a phosphorothionate) are undergoing laboratory tests.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0212, STORAGE OF MAIZE IN A CONCRETE SILO

A. OFOSU, (GH.069.0003)

Objective: To determine the conditions necessary for successful storage of maize in a concrete silo in a warm and humid environment.

Approach: A sixty-ton capacity concrete silo of the Tema Food Complex Corporation is to be filled completely with maize (m.c. not above 12%) and fumigated with phosphine. Temperature changes at various points in the silo are to be monitored with thermistors.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0213, THE PRESERVATION OF PALM FRUIT AS DEFIBRED MESOCARP PASTE

A. OFOSU, (GH.069.0004)

Objective: To increase the shelf life of palm fruit and thus facilitate its distribution.

Approach: Fresh palm fruits are boiled and pounded in a mortar. Nuts are separated from the mesocarp mass. Palm fruit paste is pressed out of the mesocarp with a press modelled after the Duchscher curb press. The paste is sterilized in cans and 'kilner' jars at 15 lb/in2 pressure for 30 minutes.

Progress: Palm fruit paste has been extracted successfully from palm fruit. The ratio of paste to raw fruit is 1:6 for local varieties and 1:4 for improved varieties of palm fruit. Sterilized palm fruit paste has been stored successfully for 12 months.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0214, MOISTURE CONTENT - RELATIVE HUMIDITY EQUILIBRIA OF SOME GHANAIAN FOODSTUFFS

A. OFOSU, (GH.069.0005)

Objective: To determine safe storage moisture contents of Ghanaian foodstuffs usually stored dry.

Approach: The foodstuffs are placed in open petri dishes and kept over saturated salt solutions in desiccators for 6 weeks at room temperature (26 degrees - 30 degrees C). Moisture content is determined by heating sub-samples in ventilated electric oven at 120 degrees C for 4 hours.

Progress: The 'safe' storage moisture contents of garri, cassava kokonte flour, roasted corn meal, dried ripe pepper powder and maize grains (local, GS2, Composite 2C4) have been determined. The results are shown below: Garri - 12.3%, Cassava Kokonte flour - 12.4%, Roasted corn flour - 10.2%, Dried ripe pepper powder - 12.2%, Maize grain (local, white) - 12.9%, Maize grain (GS2 - slightly yellow) - 12.4%, Maize grain (Composite 2C4, White) - 12.9%.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

3.0215, SUSCEPTIBILITY OF VARIETIES OF MAIZE AND COWPEAS TO PRIMARY STORAGE INSECT ATTACK

A. OFOSU, (GH.069.0006)

Objective: To find varieties of maize and cowpeas resistant to attack by Sitophilus zeamais (for maize) and Callosobruchus spp. (for cowpeas).

Approach: There are three aspects to the problem of infestation and destruction of maize and cowpeas by primary storage insects. The three aspects are to be examined separately for each maize or cowpea variety. (a) Field infestation (Giles & Ashman, 1971); (b) Inherent susceptibility (Wheatley, 1971); (c) Susceptibility to feeding by adult insects (Davey, 1965).

Progress: Susceptibility indices and percentage weight loss as parameters for measuring (b) and (c) respectively have been determined for 10 maize varieties.

SUPPORTED BY Crops Research Institute - Kumasi, Ghana

RADIOISOTOPE LABORATORY OF THE COCOA RESEARCH INSTITUTE OF GHANA

P.O. Box 8, Tafo

3.0216, THE FATE AND POSSIBLE NUTRITIONAL AND TOXICOLOGICAL SIGNIFICANCE OF METHYL BROMIDE RESIDUES IN FUMIGATED COCOA BEANS

D. ADOMAKO, (GH.832.0001)

Objective: Methyl bromide is extensively used for fumigation of bagged cocoa beans in warehouses against insect infestation before export from West Africa. The fumigant reacts with constituents of the beans with the formation of inorganic bromide and yet unknown methylation products. The investigation is to provide information on the magnitude and possible toxicological significance of these residues.

Approach: Small scale fumigation experiments are carried out with C14 labelled methyl bromide under conditions simulating warehouse practice, and residues in fermented and roasted cocoa beans are determined radiometrically after a suitable extraction and fractionation procedure.

Progress: Fumigation at 24mg/L followed by 8 days aeration results in residue levels of .30ppm in unroasted beans. Roasting reduces this level by 20 percent but this effect becomes smaller with increasing aeration time. Indications are that roasting has also an influence on the nature of the residues bound to the bean tissue.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.
Internat. Atomic Energy Agency - Austria

3.0217, THE DISTRIBUTION AND ACTIVITY OF ROOT SYSTEMS OF COCOA

Y. AHENKORAH, (GH.832.0002)

The objective of this project was to study the distribution and intensity of root activity of fruiting cocoa trees in wet and dry seasons. A knowledge of root activity would help to determine

where and when fertilizers should be applied to ensure maximum efficiency of utilization.

The experimental technique was based on the injection of P32 solution at a number of points round a tree at specified depth and distance under test. The P32 content of leaves of similar age and position sampled at intervals of 10 to 40 days after P31 application was used as a measure of root activity.

Twenty year old cocoa trees (variety Amelonado) planted at 2.4 X 2.4 meters on a sandy loam soil type showed highest root activity in the upper 2.5 cm and 7.5 cm layers of soil in both dry and wet seasons at 150 cm distance from the tree. Root activity was about six times higher in wet seasons than in dry seasons. In a comparison of different varieties, high yielding varieties had higher root activity than low yielding varieties in the upper layers of soil - but this was not always so at lower depths.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.
Internat. Atomic Energy Agency - Austria

RADIOISOTOPE LABORATORY OF THE SOIL RESEARCH INSTITUTE

Academy Post Office, Kwadaso, Kumasi

3.0218, FERTILIZER EFFICIENCY STUDIES ON BEANS (PHASEOLUS VULGARIS) AND COWPEA

C. OFORI, (GH.831.0001)

The object of this project is to see how best phosphatic and nitrogen fertilizers should be applied to grain legume crops without losing the benefits of their nitrogen fixing capacity. Field experiments will be designed to obtain answers to the following questions: 1. What is the influence of method, time and source of fertilizer application on the efficiency of fertilizer utilization? 2. What is the effect of fertilizer application on symbiotic nitrogen fixation? 3. What is the influence of other cultural practices such as irrigation and the liming of acid soils on the efficiency of fertilizer utilization and on nitrogen fixation?

In 1973 an experiment will be done to study the efficiency of different methods of placing superphosphate fertilizer and how this would interact with a small dose of starter nitrogen (30 kg N/ha as urea) and nitrogen fixation.

Using N15 labelled urea and P33 labelled superphosphate, the actual amounts of N and P taken up by the crop will be measured. The total nitrogen in the crop would be derived from fertilizer, soil and symbiotic fixation. The amount of soil N in the crop will be estimated by carrying out an experiment with N15 labelled urea on a non leguminous crop. Hence the fixed N can be estimated. Field observations will also be made to study the influence of various fertilizer treatments on nodulation and N fixation.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.
Internat. Atomic Energy Agency - Austria

3.0219, USE OF ISOTOPES IN STUDIES ON THE NUTRITION OF GROUNDNUTS

C. OFORI, (GH.831.0002)

The objective of the project was to investigate the sulphur, nitrogen and phosphate requirements of ground nuts and obtain preliminary information on optimum methods and times of fertilizer application.

Fertilizers labelled with N15, P32 and S35 were used in field experiments to measure the actual amounts of the various fertilizer nutrients N, P and S respectively utilized by the crop.

The results showed no significant differences in P utilization between different methods of superphosphate application although there was some indication that split application - broadcast at planting, and banding 3 weeks after germination - can prove beneficial. Sulphur increased phosphate utilization and forage yields, but has a tendency to decrease pod and kernel weight except when applied with urea. The application of N at 30 kg N/ha and P at 50 kg P2O5/ha resulted in highest yields, and there was no difference between urea and ammonium sulphate as sources of N. Banding N fertilizer without P or with P broadcast reduced nodulation. However, when both N and P fertilizers were broadcast or bonded together, nodulation was not inhibited.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.
Internat. Atomic Energy Agency - Austria

SOIL RESEARCH INSTITUTE

Central Agricultural Station, Kwadaso, Kumasi

3.0220, DETAILED RECONNAISSANCE SOIL SURVEY OF UPPER AFRAM BASIN

S.V. ADU, (GH.160.0001)

OBJECTIVE: (1) To identify and classify the soils of the basin. (2) To evaluate them in terms of their suitability for crop production. (3) To compile basic physico-chemical and mineralogical data on existing soils as aids to working out a soil classification system with practical significance for Ghana.

APPROACH: Soil inspection holes dug either with chisel or an auger are inspected and the soils classified on the series level. Geology, vegetation and land-use and miscellaneous information recording are also made. Final soil association, land capability, geology, vegetation and land-use and miscellaneous information maps and a comprehensive soils report are produced after the completion of the survey.

PROGRESS: So far about 2,000 sq. miles of the total area of 2,975 sq. miles has been completed and 5 soil associations with 25 soil series mapped or identified.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0221, SOIL GENESIS STUDY OF UPLAND DRIFT SOILS AND ASSOCIATED RESIDUAL SOIL

G.K. ASAMOA, (GH.160.0002)

OBJECTIVES: Establishing discontinuities in transport and residual soils. 2. Studying translocation of clay and sesquioxides in relation to discontinuities in order to assess soil development.

APPROACH: Particle size analysis of 5-cm incremental samples. Determination of NH4-oxalate and Na-Diothionite extractable Fe203 and Al203. Least squares analysis of results.

PROGRESS: Analyses nearing completion - 2 profiles remain to be done. Results so far indicate close correlation between clay and free Fe203 distribution in Forest oxysols and ochrosols; 2, and

between silt (2-20) and free F203 in savannah ochrosols and ground water lateril. There was evidence of layering in drift soils.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0222, DETAILED RECONNAISSANCE SOIL SURVEY OF CAPE COAST REGION, CENTRAL AND WESTERN REGION OF GHANA

G.K. ASAMOA, (GH.160.0003)

OBJECTIVES: 1. To map and classify the soils of the Region. 2. To evaluate the soils for agricultural land-use. 3. To compile basic data on soils and their environment as aids to working out soil classification system of practical significance.

APPROACH: The detailed reconnaissance method using available roads foot paths and cut lines as traverses for recording soils vegetation and land-use.

PROGRESS: Over half the area (about 1,300 sq. miles) under moist- semi-deciduous, forest and short grass savannah patches and thicket has been covered. Work is still in progress.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0223, DETAILED RECONNAISSANCE SOIL SURVEY OF THE LOWER AFRAM BASIN

J.A. MENSAHANSAH, (GH.160.0004)

OBJECTIVES: (1) To identify and classify the soils of the Basin. (2) To assess the soils of the Basin in terms of their suitability for crop production. (3) To provide information on the physico-chemical and mineralogical characteristics of the soils which will aid in the soil classification system of Ghana.

APPROACH: Method of survey involves the use of roads, footpaths, hunter's trails and Forest Reserve boundaries and where necessary, cut- lines generally spaced at interval of 6,600 feet apart. Soil inspection holes are dug and soils classified on series level. Geology, vegetation and land-use and land capability will be produced. A comprehensive soils report will be produced on completion of the survey.

PROGRESS: The basin covers approximately 2,135 square miles. Up to date, 1,900 square miles has been surveyed. Tentative Soil Map showing the delineation of the soils encountered with the basin in broad outlines or Soil Associations and Complexes is being prepared.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0224, EFFECT OF SPACING, VARIETY AND FERTILIZER RATE ON MAIZE YIELD IN GHANA

C.S. OFORI, (GH.160.0005)

OBJECTIVE: To determine optimum spacing and plant population of three promising maize varieties from the plant breeder's selections and to determine fertilizer application levels for these varieties.

PROCEDURE: Split-plot field experiment with spacing as main treatment and split into sub and sub-sub-plots for variety and fertilizer levels.

PROGRESS: Spacing of 3' x 9" and 3' x 1' with one seed per hole were found best for the varieties tested.

Fertilizer rates of 60 lb N, 40 lb P20 and 40 lb K20 were found to give economic yield returns. Higher nitrogen rates may not give extra yield under the conditions prevailing on this soil.

Of the three varieties, the composite 3 was found best with a yield level of 3746 lb/acre; followed by composite 2. The variety currently distributed by the Ministry of Agriculture - the Ciacol 153 was found to be inferior in yield to the two composites.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0225, STUDIES ON THE NUTRITION OF GROUNDNUTS (ARACHIS HYPOGEA L.)

C.S. OFORI, (GH.160.0006)

OBJECTIVE: (1) To determine the importance of fertilizer nitrogen beyond "starter level" to groundnuts. (2) To evaluate the efficiency of atmospheric and soil nitrogen supply to groundnuts. (3) To study methods of placement of starter N and superphosphate on the uptake of fertilizers N and P by legumes (groundnut).

PROCEDURE: Field experiment using labelled N15 fertilizers.

PROGRESS: First crop not yet harvested.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0226, EFFECT OF PLOUGHING AND FERTILIZER APPLICATION ON THE YIELD OF CROPS (MAIZE, CASSAVA AND COWPEAS)

C.S. OFORI, (GH.160.0007)

OBJECTIVE: (1) To determine yield effect of ploughing as against the traditional method of cultivation (no ploughing). (2) To compare medium and deep ploughing on maize, cassava and cowpeas. (3) To determine relationships if any between ploughing and fertilizer response. Using split-plot design.

PROCEDURE: Ploughing was main treatment. This was split to have 23NPK fertilizer treatment.

PROGRESS: Ploughing was found to increase the yield of maize and cassava significantly above the traditional hoe cultivation method. Results so far obtained showed no significant ploughing x fertilizer response interaction.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0227, THE EFFECTS OF PLANTING DATE ON THE EFFICIENCY OF FERTILIZER NITROGEN AND PHOSPHORUS IN MAIZE PRODUCTION IN SELECTED AREAS IN GHANA

C.S. OFORI, (GH.160.0008)

OBJECTIVE: To determine the efficiency of nitrogen and phosphorus fertilizers in relation to various planting dates of maize.

PROCEDURE: Date of planting is used as main treatment and split into sub-plots for 3 x 4 (PN) treatments.

PROGRESS: No data yet available.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0228, CORRELATION OF SOIL TEST METHODS WITH CROP YIELDS (MILLET AND GUINEA CORN)

A.T. HALM, (GH.160.0009)

OBJECTIVE: (1) To find the most suitable extract to available P determination. (2) To determine the critical level of P.

APPROACH: (1) Field experimentation. A randomised block design with 3 replicators was laid on 20 farmer's farms for the experiment. Various rates of P (including no P treatment) were used; Millet and guinea corn were used as test crops. (2) Laboratory analysis: Four methods were used for available P determination - Bray P, Bray P2, Truog and Olsen. (3) Greenhouse experiment: Soils from the various farms were collected and used in the greenhouse for pot experiments.

PROGRESS: Correlation coefficient studies between crop yields and available P extractions showed that only the Olsen method was significant.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0229, RESPONSE OF LOWLAND RICE TO NITROGEN, PHOSPHORUS AND POTASSIUM
A.T. HALM, (GH.160.0010)

OBJECTIVE: To investigate the nutritional requirement of lowland rice in Northern Ghana.

APPROACH: 3 x 3 x 3 factorial replicated 2 times. Fertilisers applied were Nitrogen at 0, 40 and 80 lbs. N/acre as ammonium sulphate, Phosphorus at 0,30 and 60 lbs. P2 O5/acre as single superphosphate and Potassium at 0, 20 and 40 lbs. K20/acre as muriate of potash.

PROGRESS: First year results showed that N40 P30 K0 was the best nutritional requirement of lowland rice.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0230, FIXATION OF APPLIED PHOSPHORUS IN SOME GHANA SOILS
A.T. HALM, (GH.160.0011)

OBJECTIVES: (1) To determine the phosphorus fixing capacity of some Ghana soils and (2) to determine the amount of P fertiliser required to off set the fixation.

APPROACH: Single superphosphate was added to the soils at 0, 50, 100, 150, 200, 250, 300, 400, 500 and 600 ppm P. The treated soils were then incubated for 4 days at room temperature. After the incubation period available P was extracted from the moist soils by using (1) Bray P, (2) Bray P2 (3) Truog and (4) Olsen methods.

PROGRESS: Results showed that the rate of fixation was 70% in one soil, between 42-48% in 3 soils, 48-33% in another 3 soils and as low as 22% in the remaining 3 soils.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

3.0231, RESPONSE OF MAIZE TO NP IN SELECTED MAIZE GROWING AREAS
A.T. HALM, (GH.160.0012)

OBJECTIVE: To determine the NP fertiliser requirement of maize in some of the maize growing areas.

APPROACH: Randomised block designes with 3 replications were laid on farmers farms of about 20. Varying rates of phosphorus were used in the treatments.

PROGRESS: Results indicated that on the whole the best fertiliser requirement was N80 P60.

SUPPORTED BY Soil Research Institute - Kumasi, Ghana

TAMALE VETERINARY LABORATORY
P.O. Box 97, Tamale

3.0232, LIVESTOCK DISEASE INVESTIGATION
J.K. OBINIM, (GH.212.0001)

Objective: Diagnosis of livestock diseases.

Approach: Examination of post-mortem material using bacteriological, serological, histological and parasitological aids where necessary. Field visits and examination of clinical cases where necessary.

SUPPORTED BY Ministry of Agr. - Accra, Ghana

TERMITE DIVISION
University P.O. Box 40, Kumasi

3.0233, THE NATURAL RESISTANCE OF GHANAIAN TIMBERS TO TERMITE ATTACK
M.B. USHER, (GH.411.0001)

Objective: To give definitive results on the average natural resistance and its variation of a large number of timber species occuring in Ghana.

Approach: Samples of wood were collected from 83 timber species and from a number of separate areas so that there was replication of each of the species used in the tests. Samples were cut from sapwood, outer-heartwood and inner-heartwood so as to study the characteristics of radial variation in termite resistance. Conventional grave-yard tests are being carried out. These tests will yield data on the species used for outdoor work, such as posts, poles and sleepers. Small-scale tests between glass plates to be carried out later will yield data on species for indoor use. Laboratory tests are also planned.

Progress: First inspection of blocks after 4 weeks exposure to subterranean termites has been carried out. This indicates that Pyenanthus angolensis, Ceibapentadra, Anthrocaryon micraster and Daniellia ogea are particularly susceptible to termite attack and make excellent bait wood species. No attack was observed on Erythrophleum ivorense, Nauclea diderrichii, Strombosia glaucescens and Tricchilia prieuriana.

SUPPORTED BY University of Sci. & Tech. - Kumasi, Ghana

3.0234, TERMITE ECOLOGY AT FUMESUA, GHANA
M.B. USHER, (GH.411.0002)

Objective: In preparing a test site it was decided to investigate: (1) The species of termites present; (2) The numerial abundance of these species; (3) The probability that a standard piece of wood (Triplochiton Scleroxyon, 15 X 10 X 4 cm) of a specified age would be attacked by each species; (4) Any succession of species on wood; (5) The relation between microclimate and termite distribution.

Approach: A total of 926 standard pieces of wood have been buried and examined every 4 weeks. Soil and micro-climate analyses are being made.

Progress: 31 species of termites have been recorded. T. Scleroxyon sapwood less than 4 weeks old has a probability of 0.17 to 0.013 of attack by ancistrotames (the most common of species), whilst wood over 4 weeks old has a probability of attack of about 0.30 to 0.02 in any period of 4 weeks exposure (95 percent confidence limits given).

SUPPORTED BY University of Sci. & Tech. - Kumasi, Ghana

3.0235, A STUDY OF THE FACTORS AFFECTING THE RESISTANCE OF TERMINALIA IVORENSIS TO TERMINATE ATTACK
J.K. OCLOO, (GH.411.0003)

Objective: To study the natural variability in the resistance of heartwood and sapwood cut at different heights in the same tree and the variability between trees of specified age. The natural radial variation in the resistance of the wood to terminate attack also will be studied. The correlation of the resistance with physical and anatomical properties will be studied.

Approach: Two trees are being tested. Five discs, 30 cm. thick, were cut at regular intervals (4.88 m) along each tree. Test

pieces were prepared from each disc, 8 zones (depths) being tested. Conventional grave-yard tests are being carried out now. Small-scale tests between glass plates will be carried out later. Physical properties such as the tensile modulus of elasticity and the specific gravity of each zone are being measured.

Progress: The first inspection of the grave-yard test is due in March 1973. The mean modulus of elasticity is found to be 7.5 x 10 to the 9th power N.m squared.

SUPPORTED BY University of Sci. & Tech. - Kumasi, Ghana

VOLTA BASIN RESEARCH PROJECT

University of Ghana, Legon

3.0236, HYDROBIOLOGY RESEARCHES IN THE VOLTA BASIN

S. BISWAS, (GH.350.0001)

Hydrobiological projects are being actively pursued in water chemistry and water movements, quantitative aspects of phyto-plankton, zooplankton bottom-living animals, aquatics weed, and on many aspects of the biology of fishes, including studies on their food, growth, and reproductive behaviour.

SUPPORTED BY University of Ghana - Accra

3.0237, AGRICULTURE RESEARCH IN DRAWDOWN AREAS

J. AMAMETAPKOR, (GH.350.0002)

The seasonally flooded drawdown area around the lake situated between 500 and 400 square miles on Agricultural research.

SUPPORTED BY University of Ghana - Accra

3.0238, ECONOMIC AND SOCIOLOGICAL SURVEY OF THE VOLTA BASIN

UNKNOWN, (GH.350.0003)

Economic and sociological survey of the basin in agriculture, fishing, marketing, trade, household economy and nutrition, religious practices.

SUPPORTED BY University of Ghana - Accra

IVORY COAST

BASE DE MULTIPLICATION ET DE VULGARISATION IFCC DE SAN PEDRO

B.P. 1827, Abidjan

4.0001, MINERAL FERTILIZATION ON COFFEE
P. JADIN, (IV.133.0001)
Network project - see IV. 132.0032 (4.0145)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0002, MINERAL FERTILIZATION ON COCOA
J. SNOECK, (IV.133.0002)
Network project - see IV. 132.0033 (4.0146)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0003, STUDY OF THE RESPONSE OF ELITE HYBRID CACAO-TREES TO MINERAL FERTILIZATION
J. BESSE, (IV.133.0003)
Network project - see IV. 131.0014 (4.0111)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0004, GENERATIVE IMPROVEMENT OF THE CACAO-TREE
J. BESSE, (IV.133.0004)
Network project - see IV. 132.0004 (4.0120)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0005, IMPROVEMENT OF THE COFFEE-SHRUB (C. CAREPHORA) BY VEGETATIVE MEANS
J. CAPOT, (IV.133.0005)
Network project - see IV. 132.0006 (4.0122)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

BASE DE MULTIPLICATION ET DE VULGARISATION IFCC DE ZAGNE

B.P. 1827, Abidjan

4.0006, MINERAL FERTILIZATION OF COFFEE
J. SNOECK, (IV.134.0001)
Network project - see IV. 132.0032 (4.0145)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0007, MINERAL FERTILIZATION ON COCOA
J. SNOECK, (IV.134.0002)
Network project - see IV. 132.0033 (4.0146)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0008, IMPROVEMENT OF THE COLA TREE - COLA NITIDA
J. CAPOT, (IV.134.0003)
Network project - see IV. 132.0027 (4.0140)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0009, GENERATIVE IMPROVEMENT OF THE CACAO TREE
J. BESSE, (IV.134.0004)
Network project - see IV. 132.0004 (4.0120)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0010, STUDY OF THE RESPONSE OF ELITE HYBRID CACAO-TREES TO MINERAL FERTILIZATION
J. BESSE, (IV.134.0005)
Network project - see IV. 131.0014 (4.0111)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0011, IMPROVEMENT OF THE COFFEE-SHRUB (C.CANEPHORA) BY VEGETATIVE MEANS
J. CAPOT, (IV.134.0006)
Network project - see IV. 132.0006 (4.0122)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0012, IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY GENERATIVE MEANS
J. CAPOT, (IV.134.0007)
Network project - see IV. 132.0007 (4.0123)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0013, IMPROVEMENT OF COFFEE-SHRUBS BY INTRASPECIFIC HYBRIDATION
J. CAPOT, (IV.134.0008)
Network project - see IV. 132.0008 (4.0124)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

IVORY COAST

CENTRE DE RECHERCHES ZOOTECHNIQUES DE MINANKRO-BOUAKE

B.P. 1152, Bouake

4.0014, EXPERIMENT ON FATTENING N'DAMA STEERS IN THE KRAAL, STARTED AT DIFFERENT AGES

B. GOMBAUD, (IV.161.0001)

OBJECTIVE: To determine the potentialities of intensive fattening of N'Dama animals started at different classes of age: possibility of rapid finishing of replacement cows, of five-year-old steers, longer for young bullocks or steers of 30 months.

EXPERIMENTAL ARRANGEMENT: Division of the animals into three lots according to age - Distribution: of Panicum maximum as green fodder, of coarse rice meals, crushed maize as concentrate fodder, of cotton seed. Weighing of the animals each week, weight of fodder distributed, weight of fodder left uneaten.

RESULTS: Weight: replacement cows: 370.5 g/animal/day; adult steers: 377.4 g/animal/day; calves: 349 g/animal/day. Economic: replacement cows: profit of 15,000 F (French African currency) per lot of 10; adult steers: profit of 2,000 F (French African currency) per lot of 9; calves: deficit of 65,000 F (French African currency) per lot of 11.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0015, EXPERIMENT ON FATTENING OF FULANI ZEBU CATTLE ON STYLOSANTHES PASTURE WITH OR WITHOUT A FODDER SUPPLEMENT

B. GOMBAUD, (IV.161.0002)

OBJECTIVE: To determine the potentialities of fattening of Fulani zebu calves purchased very young in the Bouake market. To find their adaptability to Stylosanthes.

EXPERIMENTAL ARRANGEMENT: Division of the animals into 3 lots: 2 lots of 11 and 1 of 10. Lot 1: 1 lot on pasture for 160 days. Lot 2: 1 lot on pasture for 60 days then on pasture plus fodder supplement for 100 days. Lot 3: 1 lot supplemented at pasture for 160 days. Nutrition: Stylosanthes cultivated as pasture. Supplement: coarse rice meals plus cotton-seed.

RESULTS: Weight: lot 1: 651.3 g/animal/day. Lot 2: 565.1 g/animal/day. Lot 3: 594 g/animal/day. No reaction to the supplement. Difficulty: poor acceptability of the concentrate, health difficulties (streptothricosis). Economic: lot 1: benefit of 14,230 F (French African currency) per animal; lot 2: benefit of 11,379 F (French African currency) per animal; lot 3: benefit of 10,829 F (French African currency) per animal.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0016, UTILIZATION OF MOLASSES FOR RAPID FATTENING OF 4-YEAR-OLD N'DAMA CATTLE

B. GOMBAUD, (IV.161.0003)

OBJECTIVE: To test the provision in the ration of a concentrate based on molasses with the prospect of the development of a large-scale sugar industry in the Ivory Coast.

EXPERIMENTAL ARRANGEMENT: Division of the animals into 2 lots: 1 lot permanently housed receives panicum as green fodder and the "molasses, rice, meal, cotton-seed" concentrate. 1 lot on permanent Stylosanthes pasture receives the same supplement.

RESULTS: Weight gain: housed lot: 493.9 g per animal per day; pastured lot: 688.9 g per animal per day. Obvious acceptability of the supplement - production of carcasses of high quality. Economic: 6,147 F (French African currency) profit per animal for the lot at pasture. 1,537 F (French African currency) profit per animal for the housed lot.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0017, EXPERIMENT ON THE FATTENING OF N'DAMA AND BAOULE BULL CALVES ON PERMANENT PASTURES OF STYLOSANTHES GRACILIS

B. GOMBAUD, (IV.161.0004)

OBJECTIVE: To determine the bases for a rustic fattening unit (feed-lot) in a zone for reclassification of populations of displaced agricultural workers. Study of the profitability of such an undertaking. To test the best adapted breed of cattle.

EXPERIMENTAL ARRANGEMENT: The animals are placed on a permanent pasture of Stylosanthes gracilis (84 animals on 30 hectares: rate of stocking 2.7 head/ha.) Inspections of fodder consumption are made before and after grazing. The animals are weighed every fortnight.

RESULTS: Weight gains: N'Dama: weight gain per animal per day 350 g. Baoule: weight gain per animal per day 200 g. Forage consumption: 35.8 kg of green Stylosanthes per animal per day. Economic: N'Dama: net profit per hectare 24,189 F (French African currency). Baoule: net profit per hectare 5,464 F (French African currency).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0018, SELECTION OF N'DAMA CATTLE IN THE RANCHES OF THE IVORY COAST

B. GOMBAUD, (IV.161.0005)

OBJECTIVE: To carry out a preliminary investigation in a considerable population of animals of the N'Dama breed in order to determine the mean weight by age-group and the possibilities of increasing it.

APPROACH: Weighing at various times of the year of young males divided into age-groups. Statistical study made on this population with determination of the mean weight per age-group, evaluation of the deviation from the mean for each age-group, calculation of the digression type of the confidence interval, definition of the mean coefficient of variance.

RESULTS: Mass selection in order to raise the animals' average performance. Constitution of a select herd. Institution of a Herd- Book.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0019, CROSSBREEDING JERSEY N'DAMA. FATTENING OF BEEF QUALITY JERSEY N'DAMA CROSSBRED CATTLE

J.C. MATHON, (IV.161.0006)

OBJECTS: To determine the possibilities of growth and fattening of Jersey N'Dama cattle under different methods of management.

APPROACH: Crossbred cattle are placed for fattening either on Stylosanthes gracilis pasture or in fattening enclosures (feed-lot) where they are fed at troughs with Panicum maximum and with local agricultural by-products (cotton-seed, meals based on rice, manioc.)

RESULTS: 1/ Fattening on Stylosanthes fallow: On the station: half-bred cattle, average age of 41 months at the start of the experiment, have made a mean daily weight gain of 470 g per animal in 97 days on experiment. In a rustic sector the mean daily gain made in an experiment lasting 271 days was 303 g. 2/ Intensive feeding in cattle pens (feed-lots): This experiment carried out over three months with half-bred Jersey cattle aged 3 1/2 months

has enabled the attainment of a mean daily weight gain of 592 grams. After 2 months on experiment, the mean daily gain was 750 g per animal. 3/ Beef qualities: The true carcass yield of half-bred Jersey animals varies from 60 to 66%. The percentage of choice cuts (sirloin plus quarter) is 55%. The organoleptic qualities of the beef are excellent. "Marbled" meat is more easily obtained than with N'Dama animals.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0020, CROSSBREEDING JERSEY-N'DAMA. 1/4 N'DAMA ANIMALS

J.C. MATHON, (IV.161.0007)

OBJECTIVE: To improve milk production, precocity and conformation of cattle of the local breed without too much reduction in their rusticity; this would enable a supply of milk to the urban centres of the Ivory Coast.

APPROACH: Regular recording of weight and measurements provides inspection of growth. Individual milk yields are recorded every day. An inspection of the butterfat content is carried out fortnightly.

RESULTS: 1/Growth: The 3/4 Jersey males weigh on average 21.3 kg at birth, 166 kg at 1 year and 338 kg at 2 years, as compared with 17.3 kg, 128.5 kg and 230.9 kg for the N'Dama at the same age. 2/ Milk production: The aptitude for milking (docility; udder conformation.) is good. The mean yield in first lactation is 1791 kg with 5.8% butterfat. The present record is 2040 kg with 5.66% of butterfat in 270 days (lst lactation). 3/ Rusticity: The adaptation to the climate and the tolerance to trypanosomes are less good than in the half-bred Jersey N'Dama. Chemoprophylaxis against trypanosomiasis is necessary.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0021, CROSSBRED JERSEY-N'DAMA. STUDY OF THE PERFORMANCE OF HALF-BREED JERSEY CATTLE

J.C. MATHON, (IV.161.0008)

OBJECTIVES: to improve precocity, conformation and milk production of N'Dama cattle without too far reducing their rusticity and their tolerance to trypanosomes.

APPROACH: Regular recording of weights and measurements enable inspection of growth. Individual milk yields are recorded at the time of the two daily milkings. An assay of the butter-fat content is carried out fortnightly.

RESULTS: 1/ Growth: The mean weight of half-breed Jersey males is 19.3 kg at birth, 143.1 kg at 1 year and 347.4 kg at 3 years, as compared with 17.3 kg, 128.5 kg and 277,9 kg for N'Dama of the same age. 2/ Perfomance of females: At adult age the half-breed Jersey cows weigh an average 340 kg against 290 for the N'Dama dams. The average age at first calving is 36 months; average interval between calvings 337 days. The mean milk yield in 3rd lactation (22 cows) is 1325 kg with 5.54% of butter-fat in 273 days. The record yield in 3rd lactation is 2100 kg with 5.35% butter-fat, or 7.7 litres per day. 3/ Rusticity: is good. The tolerance to trypanosomes appears to be conserved. The animals can be used in a peasant environment under the same conditions as the N'Dama.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0022, CROSSBRED-JERSEY N'DAMA. STUDY OF THE PERFORMANCE OF 3/8 JERSEY - 5/8 N'DAMA CATTLE

J.C. MATHON, (IV.161.0009)

OBJECT: To determine if this percentage of Jersey blood enables any appreciable improvement of conformation, precocity and milk production of cattle of the N'Dama breed, while conserving the animals' good tolerance for trypanosomes.

APPROACH: N'Dama cows being served freely by a 3/4 Jersey bull. Weights and measurements recorded regularly provide the study of growth. Milk yield of the females will be tested: recording of individual yields, assay for butter-fat.

RESULTS: The relationship of the weights at birth, at six months and at 1 year of the 3/8 Jersey to those of the N'Damas is as follows: 90%, 140%, 142% for the males; 90%, 140%, 147% for the females. The precocity of these animals seems to be excellent. They have excellent tolerance for the climatic conditions and good tolerance for blood parasitism (trypanosomiasis in particular).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0023, IMPROVEMENT OF FORAGE PRODUCTION BY ASSOCIATED CULTIVATION OF GRAMINEAE AND OF LEGUMINOUS CROPS

G. ROBERGE, (IV.161.0010)

OBJECTIVES: Study of the individual behaviour in the association of two types of grass and three leguminous crops. Study of the advantage of the association for forage. Determination of the modalities of the exploitation.

APPROACHES: Two Graminease, Melinis minutiflora (sown in seed- holes 40 x 40 cm) and Pennisetum purpureum (cuttings, 100 x 50 cm) are grown experimentally with Pueraria javanica (10 kg/ha), Centrosema pubescens (10 kg/ha) and Stylosanthes gracilis (4 kg/ha). These leguminous plants are sown in drills 25 cm apart, between the rows of Gramineae.

RESULTS: Production: The associations Melinis x Stylosanthes and Pennisetum x Centrosema produce 12.8 tons of dry matter/ha/year. The association Pennisetum x Stylosanthes: 12.6 at the rhythm of exploitation of 3 to 4 cuts per year. The associations with Pennisetum, though they present an advantage from the point of view of productivity, are constantly out of balance. The grass constricts the establishment of the legume. The latter becomes really dominant in the course of the 3rd year.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0024, EXPERIMENTS WITH FORAGE PLANTS IN IRRIGATED CULTIVATION

G. ROBERGE, (IV.161.0011)

OBJECTIVES: Determination of the productivity of 10 forage plants in irrigated cultivation with manuring.

APPROACH: 2 types of experiments have been in progress since June 1971 for three years: 1 productivity experiment of factorial design with 6 repetitions dealing with 4 plants: Panicum maximum K187B, Trypsacum laxum, Pennisetum purpureum and Stylosanthes gracilis - with 2 rhythms of production and 2 levels of fertilization: 1. 120N - 100P- 100K; 2. 300N - 200P - 300K; (for Stylosanthes, same fertilization but no N). 1 orientation experiment of latin-square design with 6 repetitions dealing with 6 plants: Panicum maximum G23, Brachiaria mutica, Brachiaria ruziziensis, Andropogon gayanus, Dolichos lablab, Pueraria javanica - 1 level of fertilization and 1 rhythm of production.

RESULTS: After one year the strongest production is provided by Panicum maximum with 40 to 49 tons of dry materials/ha. The weakest by Dolichos lablab with 9.4.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

IVORY COAST

4.0025, ASSOCIATION OF AGRICULTURE WITH ANIMAL REARING IN THE CENTRAL IVORY COAST

G. ROBERGE, (IV.161.0012)

OBJECTIVE: Determination of a system of rotation associating agriculture with animal rearing. Study of time taken for jobs. Economic study of each speculation. Economic balance.

APPROACHES: Carrying out a production programme starting from a family business associating cropping with animal rearing. Size of the business at the start: 5 cultivated fields of 0.85 ha and one natural pasture of 7 ha. Initial rotation: 1. Yams. 2. Maize followed by cotton. 3. Half maize and half groundnuts followed by tobacco. 4. and 5. Stylosanthes methods: 2 workers, 1 pair oxen, 3 cattle for fattening, implements for team cultivation.

RESULTS: Absolutely too complicated; modified in this way: 1. Yams. 2. Maize followed by cotton. 3. Maize. 4. and 5. Stylosanthes. The production of maize being irregular, the experiments will be continued with the following rotation: 1. Yams. 2. Maize followed by cotton. 3, 4. and 5. Stylosanthes. Economic result: profit $1.20 per working day.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0026, STUDY OF SETTING UP ARTIFICIAL PASTURES ON MARSHY GROUND

G. ROBERGE, (IV.161.0013)

OBJECT: Creation of reserves of forage for the dry season. Study of productivity of different forage plants at different levels of low ground.

APPROAHCES: Experimental work dealing with nine Gramineae: Digitaria unfolozi, Tripsacum laxum, Melinis minutiflora, Panicum maximum, Pennisetum merkeres, Pennisetum purpueum, Setaria sphacelata, leguminous plant Stylosanthes gracilis. Each plant is tested at 7 levels varying from O cm, (marsh) to the bank 220 cm. Study of the influence of the water level on productivity.

RESULTS: At levels 0, 1 and 2, Brachiaria mutica gives the best yields with 36, 19 and 15 tons dry material per hectare per annum. At level 6, Panicum maximum gives the best yield with 12.3 tons of dry material/ha/year.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0027, IMPROVEMENT OF FORAGE PRODUCTION IN SAVANNAH ZONE BY MODIFICATION OF THE TRADITIONAL SYSTEM

G. ROBERGE, (IV.161.0014)

OBJECTIVE: Determination of the possibilities of stocking and economic influences.

APPROACH: 2 systems are studied: management of savannah: extirpation of bushes by manual grubbing out and maintenance of the pasture by gyrotiller (rototiller). Improvement of the savannah: technique analogous to the preceding one completed by a traverse with crossed disks and a broadcast or drill sowing of 4 kg of Stylosanthes gracilis.

RESULTS: Management of savannah. The carrying capacity attained is 0,8 tropical animal unit (T.A.U.) per hectare against 0.2 T.A.U. per hectare on natural non-managed savannah. The net cost of the standing feed unit produced is 3.9 F (currency of French Africa). Improvement of savannah. The carrying capacity attained is 1.2 T.A.U. per hectare. Net cost of the standing feed unit is 3.9 F, weight gain per hectare in N'Dama steers at pasture day and night without supplementation, 170 kg per hectare per annum.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0028, VARIATION IN THE FOOD VALUE OF FORAGE PLANTS ACCORDING TO THE RHYTHM OF PRODUCTION

G. ROBERGE, (IV.161.0015)

OBJECT: To study the evolution of dry matter, nitrogenous matter, cellulose and minerals, and determination of the optimum stage for utilization.

APPROACH: In the first place 4 plants are studied in a fertilized and irrigated experiment in the following rhythms: Trypsacum and Stylosanthes: 28, 42, 56, 70 days after start of regrowth. Pennisetum and Panicum: 14, 28, 42, 56 days after start of regrowth. After each mowing, a complete analysis is carried out.

RESULTS: The analyses of dry matter show that the percentage of cellulose increases with duration and that the percentage of protein materials decreases. These modifications are similar for Panicum, pennisetum and Trypsacum. With Stylosanthes, the decrease in the percentage of protein materials is less. In irrigated cultivation the dry matter increases little with time of re-growth.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0029, STUDY OF THE ESTABLISHMENT OF PASTURES OF PANICUM MAXIMUM

G. ROBERGE, (IV.161.0016)

OBJECTIVES: Establishment of techniques for planting and for utilization. Study of productivity - experiment on the stocking rate (number of animals per hectare).

APPROACHES: 1) Study of behaviour of 24 ecotypes without fertilization. 2) Experimental study of productivity as dry cultivations with or without fertilization, on the K 187 B variety. 3) Plantation and exploitation as a large-scale irrigated cultivation: cuttings (0.40 x 0.40 m) - exploitation as restricted grazing enclosed by electric fencing - fertilization. 4) Selection in progress.

RESULTS: 1) Of 24 ecotypes studies, the best are as follows: K 187 B equals 15.8 T dry matter/Ha; O 304 equals 14.2 T; G 18 equals 13.7 T. 2) Dry cultivation, not fertilized: 17.1 to 19.2 T of dry matter (DM) per hectare; dry fertilized 34 T; irrigated, not fertilized 24.5 T; irrigated and fertilized 39 to 45 T. Mean value as dry cultivation 0.45 feed units (FU) per kg of DM. Mean value as irrigated cultivation 0.55 FU per kg of DM. 3) Exploitation on 13 hectares as restricted grazing. Rhythm of utilization: 4 weeks. Estimated productivity: 50 T of DM per hectare per annum. Mean stocking rates 13 to 19 tropical cattle units per hectare for daytime grazing. 4) Selection in progress.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

4.0030, STUDY OF THE ESTABLISHMENT OF ARTIFICIAL PASTURES OF STYLOSANTHES GRACILIS

G. ROBERGE, (IV.161.0017)

OBJECTIVES: Establishment of techniques for plantation and exploitation, study of the productivity, study of the possibilities of stocking. Economic influences.

APPROACHES: 1. Study of the productivity in experiment in dry cultivation with or without manuring, and in irrigated cultivation with or without manuring. Plantation and exploitation on a large scale. 2. Plantation after clearing, ploughing, traverses with the tiller, harrowing, sowing with the driller with raised water channels at the rate of 7 kg per hectare. Maintenance - rototiller operations. 3. Study of plantation after chemical weeding.

RESULTS: 1. Annual productivity on experiment: dry cultivations without fertilization 6,400 to 8,400 feed units; dry cultiva-

tions, fertilized 7,800 F.U.; irrigated, non-fertilized cultivations 9,700 F.U.; irrigated and fertilized 10,900 to 13,800 F.U. 2. Cultivation on a large scale: carrying capacity attained 2.7 Tropical Animal Units per ha per annum; weight gain per hectare per annum: 350 kg on N'Dama; net cost per F.U. produced 1.2 to 2.1 F (French African currency). 3. Plantation after chemical weeding: results in progress.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

CENTRE IFCC D'ABIDJAN

B.P. 1827, Abidjan

4.0031, INDUSTRIAL PROCESSING OF COFFEE

M. RICHARD, (IV.130.0001)

OBJECTIVE: Reorganization of industrial processing of Coffea robusta in Ivory Coast.

APPROACH: Comparative trials of different processing equipments.

RESULTS: Establishment of a plan for processing with adapted equipment.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0032, INDUSTRIAL PROCESSING OF COCOA

M. RICHARD, (IV.130.0002)

OBJECTIVES: Mechanisation of different processing operations at the industrial level.

APPROACH: Trial of two types of shelling equipment. Design of a 1000 T unit of commercial cocoa (fermentation - drying - bagging).

RESULTS: Decision on the best shelling equipment. Establishment of a 1000 T unit of commercial cocoa.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0033, COCOA PROCESSING AT THE FARM LEVEL

M. RICHARD, (IV.130.0003)

OBJECTIVES: Improvement of fermentation methods (Amelorado); Improvement of sun-drying.

APPROACH: Comparasion trials with several methods of fermentation; comparasion trials with several systems of mixing; comparasion trials with several durations of fermentation; Comparison of different types of sun-drying systems. Study of a new type of drying system - SAMOA - called "raised shelf".

RESULTS: Establishment of a fermentation method well adapted at the farm level; establishment of a "swinging" dryer.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0034, STORAGE AND CONSERVATION OF COFFEE

M. RICHARD, (IV.130.0004)

OBJECTIVES: Long-term conservation of dry berries and green beans.

APPROACH: Comparative study of different storage systems.

RESULTS: Establishment of long-term conservation method for coffee dry berries and its application; establishment of a long-term conservation method for green coffee beans.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0035, STORAGE AND CONSERVATION OF COCOA

M. RICHARD, (IV.130.0005)

OBJECTIVE: Long-term conservation of dry cocoa-beans.

APPROACH: Comparative trials with different types of storage.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

CENTRE ORSTOM D'ADIOPODOUME

B.P. 20, Abidjan

4.0036, OPERATION OF RESEARCH IN GEODYNAMICS, GEOCHEMISTRY AND GEOMORPHOLOGY IN THE IVORY COAST

J. DELVIGNE, (IV.300.0001)

Objective: This operation has for its object the reconstruction of the history of the climatic variations in time and space while determining the evolutionary processes of the superficial geological formations.

Approach: Cartography and determination of the geomorphological units. Geochemical, mineralogical and petrographic study of the alteration. Study of the hardened levels of laterite: bauxite, ferruginous hardened crusts. Sedimentology of the loose superficial formations. Study of the soils on the different morphological units. Studies on watersheds: hydrology, geochemistry, pedology, etc.

Results: Determination of 5 morphological units in the Ivory Coast and countries next to it. Improvement of geochemical methods of mining survey. Process of formation of the beds of aluminium (bauxite). Process of alteration of the rocks and of formation of soils according to the age of the formations. Movements and geochemistry of the surface moisture, that of infiltration and that at depth.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0037, TYPOLOGY AND CLASSIFICATION OF FERRALYTIC SOILS IN AN EQUATORIAL TO TROPICAL CLIMATE

Y. CHATELIN, (IV.300.0002)

Objective: To treat pedological information which is multiple and complex by a typological terminology and a system of classification.

Approach: Based on the Glossary for the description of soil horizons used by French pedologists, and on the typological terminology established for ferralytic soils. Application of these basic documents to the soils of the Ivory Coast.

Results: The classification of the ferralytic soils of the Ivory Coast has already yielded several approximations in succession.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0038, EVOLUTION OF FERRALYTIC LANDSCAPES IN AN EQUATORIAL AND TROPICAL CLIMATE - ALTERATION, EROSION, RECASTING, HARDENING

V. ESCHENBRENNER, (IV.300.0003)

Objective: To reconstitute the history of soils and of the landscapes which are linked with them. To explain as a function of this history the distribution of certain pedological characteristics.

Approach: Geomorphological analysis of the principal reliefs. Research on chronological markings. Geochemical evolution. Particular study of hardening, of its different aspects, of the dismantling of the hardened crusts.

Results: Reconnaissance, in the course of the quaternary period, of three complex episodes which have given a succession of hardened slopes. Identification of two tertiary hardened surfaces, the one ferruginous and the other bauxite. Differentiation of the slopes and of the versants according to climates. Great importance of modifications and of heritage.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0039, MINERALOGICAL STUDY OF FERRALYTIC PEDOGENESIS IN AN EQUATORIAL AND TROPICAL CLIMATE

F. SOUBIES, (IV.300.0004)

Objective: Analysis of the conditions for formation of minerals in ferralytic soils. Limits of formation of gibbsite, of kaolinite. Forms of iron and their relation to micro-aggregation.

Approach: Following regional studies, choice of characteristic ferralytic soils. Classical analytical methods: X-ray diffractometry, with or without deferrification, total or fractionated chemical assays, extraction of amorphous materials.

Results: Numerous observations on the alteration of the micas, the formation, then the destruction, of the kaolinite, the distribution of the gibbsite, the transition of the geethite to haematite in relation to the appearance of a pulverulent structure.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0040, STUDY OF THE MECHANISMS OF THE EVOLUTION OF SOILS AFTER CLEARING AND PUTTING UNDER CULTIVATION IN AN EQUATORIAL CLIMATE

P. DEBLIC, (IV.300.0005)

Objective: Study of the modifications brought to the current mechanisms of pedogenesis by the passage of either a natural ecosystem or a traditional agriculture, with a modernized method of utilization characterized by reduction of the fallow period and mechanization of the cropping techniques.

Approach: This study is conducted in the centre of the Ivory Coast in a climate in transition from the equatorial, with a faint degree of dryness.

The observations are, in the first place, limited to the phase immediately following the clearing operations: definition of the environmental conditions before clearing; plantation of pairs for study, cleared blocks - zones not cleared; particular emphasis on the evolution of the organic materials and of the physical and mechanical properties; definition of spatial and seasonal variability.

Results: Analysis, on some more or less recent clearings, of the spatial variability on the scale of the cultivation block and of the small plot.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0041, SUSCEPTIBILITY OF SOILS TO EROSION AND EVOLUTION OF THEIR STABILITY UNDER MECHANIZED CULTIVATION - HYDRAULICITY OF A WATERSHED

E.J. ROOSE, (IV.300.0006)

Objective: Extensive study of rivulet formation and of erosion on an experimental plot. Study of the evolution of the soil according to its nature, of the cultural treatments and of the plant covering. Study of the role of the soil in the hydraulicity of a watershed.

Approach: Utilizataon of an apparatus simulating rainfall. The apparatus model retained is the SWANSON "Rotating-Boom Rainfall Simulator" which provides the irrigation of two 50-square-metre plots with intensities of 60 or 120 mm/hour, the kinetic energy of the drops being comparable to that which is observed in nature at such intensities.

Results: The apparatus is mounted at present and ready for functioning. The demonstration should commence as soon as a pressure stabilizer has been received.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0042, STUDY THE RATES OF FLOW OF THE DIFFERENT WATER-COURSES IN THE IVORY COAST

H. CAMUS, (IV.300.0007)

Objective: a) - Techniques: knowledge of the hydrological rates of flow of the water-courses with a view to the hydraulic management of the country. b) - Scientific: determination of the exceptional amount of output in flooding and of the characteristic rates of flow of the rivers.

Approach: Exploitation of 84 control stations and of output measurements distributed over the territory as a whole: Each station is provided with an observer recording daily readings on a scale. Three field squads carry out at regular intervals rounds of inspection and gauging on the whole of the network. The findings are collected and analyzed at Abidjan.

Results: Regular publication of a year-book.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0043, HYDROLOGICAL RATES OF FLOW, SOLIDS CARRIED BY AND CHEMISTRY OF THE WATERS OF THE SAN PEDRO, NERO, AND BRIME RIVERS

M. MOLINIER, (IV.300.0008)

This study is being carried out by an agreement with the "ARSO" organization.

Objective: Determination of the annual amounts of water supplied and of the amount of flow at low water of the three rivers named. Study of the quality of the river waters in the region of San Pedro as a research site for the setting up of a paper-pulp factory.

Approach: Installation of three stations for inspection of the flow, each provided with a limnigraph. Monthly rounds of one week in the territory for collection of data on rates of flow, degrees of salinity and amounts of solid matter carried.

Results: Measurements carried out regularly in the course of the first campaign provide determination of the contributions of the three rivers and to specify the extent and the evolution of salinity.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0044, STUDY OF REPRESENTATIVE WATERSHEDS IN THE FRAMEWORK OF MULTIDISCIPLINARY ACTIVITIES IN THE IVORY COAST

A. LAFFORGUE, (IV.300.0009)

Objective: Comparative hydrological study of two small areas under forest and in savannah and complete study of a watershed including them (both) in the region of Toumodi (equatorial climate in transition): 1) Very accurate study of the moisture balance, of the solid materials carried and of their mechanisms. 2) Study of the role of water in geodynamic and geomorphological processes.

Approach: Study of the watershed of Sakassou. Classical equipment: meteorological station, 3 hydrometric stations, 6 pluviographs (recording rain-guages), 28 pluviometers. In project for

1973/74: Network for surveillance of the water table (wells and piezometers); apparatus for measuring humidity of soils; apparatus for measuring hypodermic flow; plots for rivulet formation and rainfall simulator.

Results: Installation of the hydrometric infrastructure. Observations of surface hydrology for the 1972 rainy season (analyses in progress).

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0045, STUDY OF RIVULET FORMATION, OF INFILTRATION AND OF THEIR CONDITIONAL FACTORS ON THE KORHOGO WATERSHED

H. CAMUS, (IV.300.0010)

Objective: Fine analytical study of the conditions for rivulet formation and for infiltration on a small watershed from permeable granitic sands containing a covering that conducts the water which is drained by the thalweg away from the watershed. General understanding of the mechanism of penetration of water into the surface horizons.

Approach: Classical equipment: meteorological Station, hydrometric station, 3 pluviographs, 27 pluviometers. 1 ERLO case (E. ROOSE). 16 tubes for a neutron humidimeter.

Results: Knowledge of the permeability of the different types of soil. Knowledge of the annual amplitude of the moisture profile of these five types of soil. Knowledge of the phenomena of rehumectation and of drying-up-again linked with a heavy downpour of rain.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0046, PROBLEMS CAUSED BY THE CONTACT OF FOREST WITH SAVANNAH IN THE IVORY COAST

J.M. AVENARD, (IV.300.0011)

Objective: Study of the forest-savannah contact in the Centre, the West-Centre and the South of the Ivory Coast. Attempt to draw up an ordered list of the predisposing, causal factors and the factors of maintenance of the separation of the forms of vegetation. Proposals for a possible better utilization of the land.

Approach: 1) Inventory of the environments facing each other by a systematic balance of their characters; 2) Ranging of the factors in order of importance and regional and total synthesis at the national level (Ivory Coast). Research work undertaken, either by physical geographers alone, or as interdisciplinary teams including also political geographers, soil scientists, botanists and one palynologist. They are concerned chiefly by soil moisture (repeated measurements at the stations), the soil-geomorphology-plants relationships at the level of transects cutting across the topography, the study of the relationships of man with the environment, the study of the geomorphological evolution which has entailed the present separation in the zone studied.

Results: The soil moisture is the primordial element in the separation of forms of vegetation: the forest blocks and forest corridors correspond with favourable basic environments, the savannahs are located on the soils that retain moisture less efficiently. The different observations on the transects seem moreover to show the importance and the predominance of the geomorphological conditions.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0047, STUDY OF THE POLLENS OF THE REGION OF CONTACT BETWEEN FOREST AND SAVANNAH

J.P. YBERT, (IV.300.0012)

Objective: To reconstitute the evolution of forests and savannahs in the course of the 1st quaternary period.

Approach: a) To assemble a collection of the pollens of plants living at present in savannah and in forest, starting from samples collected in the field or in a herbarium and treated by the acetolysis method. b) To study the distribution of the pollens belonging to the two groups of ecosystems with the aid of traps arranged in forest and in savannah and intended to gather the falling pollen. The analysis of the contents of these traps should enable the selection of the ecologically representative pollens. c) To study the atmospheric pollen content with the aid of traps mounted on weather vanes (Montpellier laboratory type for Palynology) in order to determine the distances pollen is carried. d) To analyze the pollen content of the quaternary sediments.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0048, STUDY OF GROWTH AND OF RHYTHMIC DEVELOPMENT IN JOINTED PLANTS AND FLUSH PLANTS

PREVOST, (IV.300.0013)

Objective: The object is a macroscopic and histological study of two modes of rhythmic growth not linked with climatic factors, in the Lower Ivory Coast.

Approach: Description of the architectural types by phenological observations (branching, position of the inflorescences). Regular measurements to define these rhythms. Histology of the growth points (normal growth, branching). Morphogenic correlations regulating development (apical dominance).

Results: Definition of the joint linked with the life span of the apical meristem. Classification of the architectural types within the Apocynaceae. Lateral apical ramification (pseudodichotomy). All this has been observed on some woody Apocynaceae of the Ivory Coast.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0049, STUDY OF THE PHYSIOLOGICAL MECHANISM OF TUBER FORMATION IN A TROPICAL ENVIRONMENT

M.F. TROUSLOT, (IV.300.0014)

Objective: To demonstrate the factors which determine tuber formation, the dormancy and the emergence from the dormant state of tubers in a tropical environment.

Approach: Observations and sampling in the field; in the laboratory, experimental work in climatic rooms or cells, and under glass.

Results: For practical reasons (restricted equipment), this study has been made up to the present time on an orchid of small size (genus Nervilia). The intention is to continue this study on some other species, especially food plants, within the limits of the means of the laboratory. Non-regulative role of the photoperiod in the tuber formation of 4 species of Nervilia. Importance of the thermoperiod. Importance of the conditions of storage of the tubers on their sprouting, the growth and the tuber formation which arise from them.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

IVORY COAST

4.0050, FOREST ECOLOGY IN THE LOWER IVORY COAST

F. BERNHARDREVERSAT, (IV.300.0015)

Objective: Description of the evergeen forest and of its functioning at different levels.

Approach: a) Numerous surveys in three types of forest. b) Cycles of organic matter and of mineral elements; applications to the soil by the litter and leaching by the rains; decomposition of the litter by losses of weight and liberation of mineral elements; experimental study of the causal factors: rain, nature of the soil, biotic factors; storage in the vegetation; losses by lixiviation. c) Growth of trees in relation to the weekly moisture balance of the forest. d) Ecology and physiology of natural regeneration.

Results: Demonstration of seasonal cycles of growth activity. Estimations of biomasses, of productivity and of moisture and chemical balances.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0051, MECHANISMS OF CLIMATIC ACTION ON PRODUCTION AND CONSUMPTION OF WATER BY A FORAGE CROP IN A HUMID TROPICAL CLIMATE

M. ELDIN, (IV.300.0016)

Objective: To analyze the yield of moisture and of energy from a growing crop in a humid tropical climate so as to be able to define the methods of cultivation (density of plantation, height and frequency of mowing, rates and rhythms of irrigation) and the anatomical and physiological variable factors to be selected in order to obtain a maximal production.

Approach: Determination of the different terms of the balances of mass and of energy of a plant cover in its entirety, then by horizontal sections of plant material in relation to the anatomy and biology of the plants studied. In the first stage, the study will be carried out in the absence of advection to the range of cover studied. In a second stage, the influence of the proximity of the forest on the production and the water consumption of the crop will be analyzed.

Results: Establishment of techniques and apparatus for measuring; Results concerning the energy balance of the cover in its entirety; Cartography of the evaporation-transpiration potential and of moisture deficits in the Ivory Coast.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0052, STUDY OF THE INTERACTIONS BETWEEN THE SOIL AND FORAGE PLANTS IN A HUMID TROPICAL ENVIRONMENT

B. BONZON, (IV.300.0017)

Objective: To specify the interest of a forage crop in the cropping arrangements and rotations in a humid tropical environment.

Approach: a) Study on a multilocal arrangement: Adiopodoume (1122) - AF; Bauake (1411) Gagnoa (1131) - LF. 1) of the evolution of the principal characteristics of these soils under different forage crops with or without fertilization, in slow or intensive utilization; 2) of the evolution of the principal characteristics of these crops: productions, residues, their root development, minerals taken from the soil and those immobilized; 3) of the residual effects of these crops upon a maize crop. b) Studies of the cation exchange capacities of the roots, of the rhythms of emissions from the roots, of the components of the yield. c) Methods and means: analyses, determination of the hydrodynamic characteristics of the soils by the VERGIERE method; surveys of moisture profiles using the neutron probe; laboratory for study of the root systems (cation exchange capacity of roots).

Results: Measurements of forage crop production obtained on the three stations.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0053, METHODOLOGY FOR THE IMPROVEMENT OF COFFEE-TREES BY INTERSPECIFIC HYBRIDATIONS

F. BERTHOU, (IV.300.0018)

Objective: Programme carried out within the framework of a convention (ORSTOM - IFCC) for the qualitative improvement of the coffee produced in the Ivory Coast by means of interspecific hybridation. (Coffea arabica times C. robusta).

Approach: Research on how C.robusta and C. arabica parents can be produced that will be of value, not for themselves, but for the quality of the hybrids directly obtained from them. 1) Determination, starting from a diallele set of interspecific hybrids, of aptitudes of C.arabica and C. canephora parents. 2) Research on the genetic variabilities of C. arabica and on the possibilities of creating structures with high aptitudes in interspecific hybridation. 3) Same procedures for C. robusta-C. canephora, with the addition of the exploration of an intermediary link for amplification of the variability, the transition from the diploid to tetraploid forms.

Results: In the progeny from the crossing of an C.arabica female with a C. robusta tetraploid male, two categories A and R can be distinguished. The rate (incidence) of A forms depends on the C.robusta sire irrespective of the C.arabica utilized. The A and R forms have characters which are dependent on general aptitudes of the C.robusta parent.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0054, BIOLOGICAL PROBLEMS IN THE IMPROVEMENT OF PANICUM MAXIMUM

J. PERNES, (IV.300.0019)

Objective: To establish: 1) Methodology for the utilization of apomixy in improvement of plants. 2) The genetic bases for the improvement of Panicum. 3) The possibilities of the specific improvement of the seed value of the best clones.

Approach: 1) Analysis of the heredity of apomixy and of sexuality. 2) Study of the quantitative genetics of Panicum species and definition of their aptitudes for intergroup combination. 3) Genetic processes of dormancy and their regulation.

Results: Panicum maximum is an autotetraploid, whose mode of reproduction is facultative apomixy. The sexuality can be restored in two ways: The one, starting from sexual diploid forms, by the intermediaries of sexual artificial tetraploids and of hybrids between these forms and the apomitic ones (the hybrids may be either sexual or apomictic). The other, passes through hybrid forms with another species of the group Panicum infestum, by increase in the level of sexuality. The diploid forms and the sexual tetraploids derived from them constitute a starting material for production of forage plants comparable to the best apomictic ones.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0055, BIOCHEMISTRY OF THE RESISTANCE OF THE COTTON PLANT TO DROUGHT

J. BRZOZOWSKA, (IV.300.0020)

Objective: To demonstrate biochemical mechanisms, at the cellular level, by means of which plants withstand drought. The results should provide guidance for selection work aimed at obtaining varieties that are more resistant and better adapted to the African environment.

Approach: Cultivation under glass; osomotic shock in polyethylene glycol or drying of the soil; ultracentrifugation for separation of the subcellular fractions; electrophoresis on gel and chromatography (proteins and amino-acids); spectrophotometry (gel and phenolic compounds); enzymic activity (acid phosphatase).

Results: Composition of the chloroplast membrane; distribution of acid phosphatase at the subcellular level; composition in polyphenols of species susceptible and resistant to drought.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0056, STUDY OF THE ORGANIC MITROGENOUS CONSTITUENTS OF THE LATEX OF HEVEA BRASILIENSIS

J. BRZOZOWSKA, (IV.300.0021)

Objective: To know the distribution of the nitrogenous constituents, principally the free amino-acids, in the different compartments of the latex and their evolution according to different physiological and organic variables. Their availability for the reactions of biosynthesis is linked with the regeneration of the latex, a limited factor in production.

Approach: Sampling of the latex from different clones; stimulation of the trees by ethylene; ultracentrifugation to separate particular fractions; assay of free amino-acids by column chromatography (autoanalyzer).

Results: Qualitative and quantitative differences between the pool of free amino-acids of the cytoplasm and of the lutoids.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0057, STUDY OF THE MECHANISM OF THE COAGULATION OF THE LATEX OF HAVEA BRASILIENSIS DURING TAPPING

J. BRZOZOWSKA, (IV.300.0022)

Objective: The very superficial character of the coagulation of the latex remains unexplained. Knowledge of the mechanism of the coagulation should enable an effect to be produced on the duration of the flow, thus on the yield in rubber.

Approach: Sampling of the latex under oxygen and under nitrogen. Research on the enzymes responsible for coagulation. Study of the phenolic compounds of different compartments of the latex.

Results: Demonstration of the role of oxygen and of nitrogen in the process of coagulation. Fall in the polyphenoloxidase activity under the effect of the stimulation bringing about an increase in yield of latex.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0058, THE ROLE OF THE LUTOIDS IN THE PHYSIOLOGY AND THE FLOW OF THE LATEX OF HAVEA BRASILIENSIS

B. MARIN, (IV.300.0023)

Objective: We are seeking to demonstrate an intervention of processes of proteo-synthesis in the labilization of the lutoid membranes and in the activation of certain enzymic activities of the lutoids.

Approach: Latex, collected in plantations after tapping, is centrifugated: a fraction enriched in lutoids is thus obtained (differential or isopycnotic centrifugation). The properties of this fraction are then studied by classical biochemical methods (assay of proteins, nucleic acids and of various enzymic activities, separation of molecules by gel electrophoresis, by chromatography, by density gradient centrifugation).

Results: In a first stage RNA (ribonucleic acid) has been isolated from this subcellular fraction. We must now study its nature, and in a subsequent stage, its intervention in a possible lutoid protein synthesis.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0059, ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT

L. BELLIER, (IV.300.0024)

Objective: The object of the studies undertaken is to specify the ecology of these savannah rodents and to define their adaptations to the environment of cultivated land; on the basis of the findings it will be necessary to establish methods for controlling these destructive rodents.

Approach: It has appeared to be necessary in order to adapt to African conditions the trapping methods used in Europe, to undertake a revison of the systematic classification of the rodents of the savannah, to determine the species that is destructive in the palm plantations at Dabou; to study the ecology of the savannah rodents in their natural evironment (Lamto RCP No. 60 of the CNRS) and in the Dabou plantations; to proceed to experiments with poisons in the laboratory and in nature.

Results: At the present stage it may be considered that the systematic part and the ecology of the species is at an end. The evolution of the populations in plantation and the destructive species in palm plantations determined.

The next stage envisaged will be the study of toxic substances on the principal species of rodents.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0060, BIOLOGY AND PHYSIOLOGY OF A SAVANNAH RODENT

J.C. GAUTUN, (IV.300.0025)

Objective: To determine the external and internal factors which govern the reproduction of a wild rodent (Leminiscomys striatus) in a tropical climate.

Approach: This study is made with the aid of classical techniques (histology and evolution of the weight of the sex organs) and of new ones (assays of hormones). It has necessitated the creation of a breeding unit in order to establish the duration of gestation, the duration of the vaginal cycle and the study of puberty.

Results: A general sexual cycle has been demonstrated in the central savannahs of the Ivory Coast (region of Bouke) and a modification of this cycle by minimization in the palm plantation of Dabou. We have made a study of the fertility of certain species, thanks to their breeding in captivity. We have determined the age of puberty, after checking the validity of the criteria of age utilized in the case of some other species in Europe.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0061, BIOLOGICAL AND ECOLOGICAL RESEARCH WORK ON THE ENTOMOLOGICAL FAUNA OF THE HERBACEOUS SWARD OF A PRE-FOREST SAVANNAH

Y. GILLON, (IV.300.0026)

Objective: Knowledge of the elements of the fauna and of their relative importance according to the environment (groups of arthropods and species in certain cases). Measurement of flows of energy corresponding to feeding, to production and to the speed of renewal of the insect populations

Approach: Quantitative samplings (cages of 1 squre metre and of 10 sq. m.- surveys in broad daylight over 25 sq. metres). Quantitative and qualitative rearing . Calorimetric measurements.

Results: Inventory of the fauna with detailed study of the juveniles (mantis species, Acridians, Pentatomidae). Annual cycles of the principal groups and the principal species of Acridians and of Pentatomidae. Characteristics of the feeding of certain species of Acridians. Relative abundance of the species according to seasons. Provisional energy balances.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0062, BIOGENETIC STUDY OF INSECT MARAUDERS OF COTTON IN THE IVORY COAST

D. DUVIARD, (IV.300.0027)

Objective: Ecology of the insects that are harmful to the cotton- plant; mode of infestation of fields from the natural habitat surroundings.

Approach: Study carried out in liaison with the IRCT. Trapping and collection of insects in the different biotopes studied. Meteorological and microclimatic study of the factors responsible. These studies as a whole have necessitated the installation of a permanent field station.

Results: Ecology of Dysderous voelkeri (Hemiptera, Pyrrhocoridae). Inventory of the host plants. Annual cycle and preliminary data on the population dynamics. Physiological and climatic mechanism of the seasonal migrations. Ecology of the aphids of the cotton-field; seasonal fluctuations of the winged populations; mode of infestation of the field. Ecology of the Jassidae of the cotton-field; inventory of the species seasonal fluctuations; mode of infestation of the cotton- field.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0063, BIOLOGICAL RESEARCH STUDIES ON MIRID OF COCOA - DISTANTIELLA THEOBROMAE

J. PIART, (IV.300.0028)

Objective: Experimental study of the phenomena of feeding and of reproduction of mirids. Relations between the condition of the cacao tree and the biological characteritics of the mirids.

Approach: Continuous breeding of mirids in the laboratory. Study of the different biological characteristics as a function of the diet. Study of ovogenesis.

Results: Establishment of a method for rearing the insect studied. Demonstration of the nutritional origin of the fluctuations of fertility observed in breeding studies. Proof of the influence of diet, linked with the phenology of the cacao tree, on post-embryonic development and the reproduction potential of the insect. Study of the feeding behaviour and analysis of the phenomenon of stenophagy. Influence of the nature of the diet on the course of ovogenesis in the females. In the pathology department of the laboratory, description of a bacterial disease and of four fungal diseases affecting mirids.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0064, DETERMINATION OF THE TRIBES OF ORANGE RUST OF THE COFFEE-SHRUB IN THE IVORY COAST - CHARACTERIZATION OF THE RESISTANCE OF COFFEE-SHRUBS

M. GOUJON, (IV.300.0029)

Objective: Inventory of the biological Tribes of Hemileia vastatrix in the Ivory Coast. Evaluation of the resistance of the cofee-shrubs intended for the replantations programme in the Ivory Coast.

Approach: Establishment of the technique of artificial infection of the leaves of the coffee-shrub with Hemileia vastatrix. Constitution of the collection of differential clones to facilitate distinction between the Tribes of rusts according to the range of disease signs obtained. Provision of incubation chambers in order to reproduce the conditions of temperature, humidity and lighting required for artificial infection. Collection of samples (leaves from coffee-shrubs bearing the rusts).

Results: Generalized presence of Tribe II and detection of one sample attributed to Tribe X.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0065, MORPHOGENESIS OF FUNGI WITH RHIZOMORPHS AND WITH SCLEROTIA

M. GOUJON, (IV.300.0030)

Objective: Research on procedures capable of blocking the internal mechanisms of morphogenesis of soil fungi propagating themselves by rhizomorphs or preserving themselves by sclerotia.

Biological material: Leptoporus lignosus (Kl.) Hein; Corticium rolfsii (Sacc.) Curzi.

Approach: Study of the morphology of the hyphae obtained in pure culture. Demonstration of the existence of two different states: thallus A and thallus B for L. lignosus and lateral filaments and leader filaments for C. rolfsii. Study of the physiological aptitudes of each of these two states. Research on the morphogenetic factor; experiments with cuttings and with grafts.

Results: Isolation of the morphogenetic factor - findings on its nature and on its synthesis (C. rolfsii). For L. lignosus the determination of differentiation is dependent upon an internal morphogenic factor and upon a propagation factor in the substrate.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0066, STUDY OF THE PARASITIC FUNGI OF MARSHLAND CROPS - ANNUAL AND GEOGRAPHICAL VARIATION OF THE MYCOFLORA

DECLERT, (IV.300.0031)

Objective: Identification of the disease agents of marshland plants observed in the different cultivated plantation zones and in different seasons of the year. Classificaton of these agents in order of importance. Study of the preservation, of the spread and of the infection in the case of the most important. Study of their sensitivity to the conventional fungicides. Study of the sensitivity of the varieties used.

Approach: Tours of inquiry. Collection of samples. Microscopic examination. Isolation and setting up of cultures. Establishment of artificial infection. In-vitro tests of fungicides. Varietal experiments in the field with control of natural infections.

Results: Partial for Alternaria solani and Corynespora casiicola, parasitic on the tomato.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0067, VARIABILITY OF THE PATHOGENIC CAPACITY OF PARASITIC FUNGI

M. GOUJON, (IV.300.0032)

Material: Ascomycete parasitic on tropical plants: Ceratocystis fimbriata (ELL Halst).

Objective: To define the genetic nature of the parasitic specificity of the different strains of the fungus and to specify the mechanisms of variation of the pathogenic capacity.

Methods: Study of the sexuality, genetic analysis of the crossings between clones of the parasite. Study of the parasexuality, the

obtaining of Heterocaryons and analysis of the possible mitotic recombinations.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0068, STUDY OF THE MECHANISMS OF PARASITISM

M. GOUJON, (IV.300.0033)

Material studied: Phytopathogenic fungus: Corticium rolfsii (Sacc.) Curzi.

Method: Analysis of the extracellular enzymes excreted by the parasites.

Results: This pathogenic capacity is confined to only one of the constituent mycellial types of the thallus of C. rolfsii.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0069, STUDY OF THE BIOLOGY OF HETERODERA ORYZAE, A TROPICAL NEMATODE, PARASITE OF INUNDATED RICE IN THE IVORY COAST

G. REVERSAT, (IV.300.0034)

Objective: To know the factors influencing the hatching of the eggs which ensure the conservation of the species in the course of the interval between cropping campaigns, and the factors necessary for the penetration of the nematodes into the roots of the host. To determine among these the factors that are capable of being controlled.

Approach: Study of the respiratory physiology of two successive stages (eggs, then larvae) in relation to the factors which intervene in the course of this stage (hatching, then penetration). Monoxenic rearing of the parasite on rice plantations cultivated in a sterile environment. Measurements of the respiratory intensity with the aid of an apparatus with an exterior stopper. The penetration of the parasite into the host, under the influence of genetic or physiological factors, distinct according to whether they are linked with the parasite, with the host or with the environment, is studied quantitatively by the methods of classical nematodology. Comparative experiments on penetration according to the rearing conditions are in progress. The influence of ecological factors on the respiratory intensity of the parasite is studied by microrespirometry. Mesurements of the respiratory intensity of the eggs and of the larvae according to the environmental conditions.

Results: Establishment of techniques for monoxenic breeding and for microrespirometry. The penetration of the nematodes into the roots seems to depend on numerous variables (quantity of inoculum, number and age of the plants, volume and nature of the solid substrate, and mode of cultivation, dry or submerged). The respiratory mean of an active larva is at least twice as high as that of the eggs in a cyst. Hatching therefore corresponds to an activation of the metabolism of the young larva.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0070, NEMATOLOGICAL STUDIES ON THE PARASITES OF YAMS, NOTABLY SCUTELLONEMA BRADYS

J.J. SMIT, (IV.300.0035)

Objective: To study the geographical distribution of Scutellonema bradys and other nematodes associated with yams cultivated in the Ivory Coast, and the means of control (in particular, treatments appropriate for the seed tubers, the principal source of new infections).

Approach: 1) Nematological surveys in the major yam-producing areas of the Ivory Coast. 2) Attempts to suppress the nematodes in the tubers (heat treatment). 3) To study the evolution of exophytic and endophitic populations of S. bradys in the soil and in the tubers, their penetration into the tubers. 4) To establish techniques for extraction of nematodes from the tubers at that time and to specify the best methods for sampling the tubers. 5) To define the range of host-plants contraindicated in crop associations with yams. 6) Morphological studies of S. bradys and related species. 7) Study of the development of S. bradys.

Results: S. bradys is very widely distributed in the Ivory Coast. A comparative study has been made of the nematodes associated with yams. A new species Peltamigratus striatus has been described for the Ivory Coast, also a new species of Scutellonema. S. bradys is the cause of deterioration in the quality of the tubers placed in storage. The heat- treatment chosen for ridding the tubers of nematodes has the advantage of not being phytotoxic. The exophytic populations of S. bradys have difficulty in surviving in the soil in the absence of yams; The onophytic populations, despite their high mortality rate, are maintained especially in the tubers.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0071, STUDY OF THE ROLE OF THE NEMATODE VECTORS OF VIRUS IN THE TRANSMISSION OF THE VIRUS DISEASE OF PANICUM MAXIMUM IN THE IVORY COAST

G. GERMANI, (IV.300.0036)

Objective: To define the possible role of the phytoparasitic nematodes, detected in the rhizosphere of the plants with virus disease and belonging to the genera Trichoderus and Xiphinema, known to be vectors of viruses, in the transmission of the disease.

Approach: The hypothesis of a nematode vector of virus having been set forth, research work has been undertaken on the direct action of the nematodes present on the plant and the possible role of the two genera of nematodes in the virus disease ("streak"). Two types of research have been undertaken: 1) Pricking-out of seedlings that have emerged from seeds of plants susceptible to the virosis, on sterilized soil and on soil coming from the diseased zone. 2) Inoculation of Trichodorus and Xiphinema on young seedlings of Panicum maximum, susceptible to the virus, with the object of setting up the "symptoms". This work is being carried on jointly with the ORSTOM laboratory of Virology, thus ensuring the necessary virological analyses.

Results: Triturations of Trichodorus and Xiphinem originating from virus-diseased strains have been analysed under the electron microscope. Only those of Trihodorus harboured viral particles.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0072, NEMATOLOGICAL STUDIES ON COTTON PLANTS AND DIFFERENT FIBRE PLANTS IN DAHOMEY

G. GERMANI, (IV.300.0037)

Objective: This study on the possibility of a role played by nematodes in Parakou disease is being made by agreement with the I.R.C.T. In the course of the missions sent to Dahomey these studies have been extended to other parasites of the cotton plant, especially Meloidogyna, and to other fibre plants (Hibiscus, Corchorus).

Approach: I. Parakou disease - To confirm or invalidate the hypothesis that this disease was caused by one or more nematodes capable of acting directly or by introducing into the plant a virus or a toxin. Three types of research have been carried out: 1) To compare the exophytic scidophytic populations of nematodes associated with affected plants and with healthy plants. 2) To at-

tempt to set up the symptoms of the disease by inoculation of young cotton plants, in sterile land, with nematodes found associated with affected plantations. 3) To attempt to get the disease under control by nematocide treatment. II. Meloidogyne and other nematodes. In the South of Dahomey, cotton-plant Hibiscus and Corchorus are severely attacked by nematodes belonging to the genera Meloidogyne, Pratylenchus and Rotylenchulus. The research studies undertaken are: 1) Nematocide experiments on cotton and Hibiscus, evaluation of the economic loss due to nematodes on different varieties, determination of the efficacy of soil treatment under the local ecological conditions, research for less susceptible varieties for the affected zones; 2) Survey of the incidence of Meloidogyne in the South of Dahomey. 3) Study of the pathogenicity of the three genera of nematodes for the cotton plant and that of Meloidogyne for Hibiscus.

Results: The nematodes do not play any role in Parakou disease of the cotton-plant. Nevertheless, the pathogenic effect of the nematodes on the cotton plant is probably associated in the etiology of this disease with the activity of the disease agent responsible for this affection.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0073, NEMATOLOGICAL STUDY OF CHLOROSIS OF LEGUMINOUS PLANTS AND OF STUNTING ("CLUMP") OF GROUNDNUTS IN UPPER VOLTA

G. GERMANI, (IV.300.0038)

Objectives: 1) As the connection between chlorosis and the nematode Aphasmatylenchus straturatus can be considered as certain, a solution is being sought to check this disease. The biology of the parasite is being studied. 2) The stunting of groundnuts ("clump"), like chlorosis, presents the aspects characteristic of a nematode (development in patches, slow extension in the course of the years). To define the possible role of nematodes or nematode population in the disease.

Approach: The studies on chlorosis and "clump" are the subject of an agreement with the I.R.H.O. and "clump" is also being studied by O.R.S.T.O.M. in Senegal. Trials of nematocide preparations, evaluation of the economic influences, delimitation of their geograhical distribution, breeding of Aphasmatylenchus, research on the host plants, research for a virus or other associated disease agents.

Results: Nematocide trials positive. The surveys show that the chlorosis area may be extended to the South of Upper Volta and that the nematode Aphasmatylenchus must be considered as a limiting factor in the cultivation of leguminous plants; five host-plants, all Leguminosae, identified. Aphasmatylenchus is maintained on Arachis and Cajanus indicus; relation between the intensity of the symptoms of chlorosis and the number of nematodes present. In Senegal, the symptoms of "clump" have been reproduced in Arachis by inoculation with a population of nematodes not yet identified. See also Project SG.151.0040.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0074, IDENTIFICATION OF A VIRUS DISEASE OF PANICUM MAXIMUM

L. GIVORD, (IV.300.0039)

Objective: Identification of the pathogenic agent and of the natural vector of the disease with a view to a study of the possibilities of control.

Approach: Study of the modes of transmission. Study of the range of hosts. Establishment of a technique for purification. Preparation of an antiserum.

Results: It is probably the question of a virus transmitted by the soil.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0075, THE VIRUS DISEASES OF THE COTTON CROP IN WEST AND CENTRAL AFRICA

L. GIVORD, (IV.300.0040)

Objective: Identification of the pathogenic agents. Determination of the natural mode of transmission. Selection of resistant varieties for controlling the disease.

Approach: Classical methods of plant virology, of entomology and of genetics.

Results: Symptomatology and transmissson of mosaic disease of the cotton plant. Transmission of the disease, with electron microscopic observations.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0076, IDENTIFICATION OF DISEASES OF FOOD CROPS - MANIOC (CASSAVA) AND YAMS

J. DUBERN, (IV.300.0041)

Objective: Identification of the pathogenic agents and of their natural vectors with a view to study the possibilities of control.

Approach: Study the modes of transmission; Demonstration of the "range" of hosts and the in-vitro properties; Establishment of a purification technique; Immunological study.

Results: Earlier studies resumed and confirmed: positive transmission of an Aleyrode. The methods habitually used in virology have all failed; it has not been possible to transmit or to isolate any virus nor to detect any in the electron microscope.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0077, IDENTIFICATION OF VIRUSES OF MARKET GARDENING PLANTS IN THE IVORY COAST - GOMBO (OKRA), PASSION-FRUIT AND PEPPER

L. GIVORD, (IV.300.0042)

Objective: Identification of the disease agent and its natural vector in view of a study of the possibilities of control.

Approach: Study of the modes of transission. Description of the range of hosts and in-vitro properties. Establishment of a purification technique. Immunological study.

Results: The virus of the mosaic disease of Gombo (Okra mosaic virus), the passion-fruit ringspot virus and the pepper veinal Mottle virus have been identified, their properties have been described and a method of purification established. A fine serological study has been made.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

CENTRE ORSTOM DE PETIT BASSAM

B.P. 4293, Abidjan

4.0078, BALANCE AND PROSPECTS ON THE USE OF TRACTORS IN AGRICULTURE IN THE IVORY COAST

P. BONNEFOND, (IV.310.0001)

Objective: Evaluation of agricultural motorization as an agent for development: ways of bringing it in, economic effects and future prospects in an African country on the way to development.

Approach: Evaluation of the tractor park and its geographical spread. Provincial types of farms or enterprises employing tractors, nature of uses, cultivators concerned. Types of owners in the Ivory Coast, motivation and reactions, economic consequences of the use of tractors in agriculture, practical problems concerning the calculation of charges for motorization, financing of investments, problems of management and development of motorized farms.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0079, INFLUENCES OF THE SODEPALM OPERATION IN THE EBRIE COUNTRY

A.M. PILLETSCHWARTZ, (IV.310.0002)

Objective: Study of the encounter of a traditional system of exploitation with a recently planted industrial system of plantation.

Approach: Social and economic history of the region, study the entire group of villager-planters connected with the complex, study of the workers' village; their economic integration and their relations with the zone. Study of an "Ebrie" community in the complex, evolution of the agrarian structures of the land-tenure and the times taken for tasks, budgetary inquiry and utilization of the income, the relations with Bingerville.

Results: In the course of being edited.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0080, FACTORS AND PROCESS OF CHANGE IN THE "BETE" COUNTRY

J.P. DOZON, (IV.310.0003)

Objective: Study of a social group, up to now not participating in the dynamic process of development of the country, faced today with: possibilities of social change (urbanization and migration), possibilities of technical innovation (intensive cultivaton of rice).

Approach: Analysis of the conditions of transition from traditional rice cultivation to an intensive rice cultivation. Analysis of the social relations of production and of land-tenure systems; relations between autochthonous groups and "foreign" groups. Analysis of the situation of retarded people in the medium-sized towns Gagnoa and Daloa.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0081, CONTINUITY AND CHANGE IN THE STRUCTURES OF "TRADITIONAL" PRODUCTION UNITS - THE CASE OF THE KOKUMBO REGION

J.P. CHAUVEAU, (IV.310.0004)

Objective: Study, through the production concerns, of the transition of a precolonial dynamism to a present-day dynamism.

Approach: History of the region; analysis of the historical methods of production; studies of present-day exploitations in eight villages in the region.

Results: Publication.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

4.0082, A RESIDUAL SOCIAL GROUP CHALLENGED WITH THE DEVELOPMENT OF MARKET CROPS - ALLOCHTHONOUS IMMIGRATION AND LAND PROBLEMS

J.P. CHAUVEAU, (IV.310.0005)

Objective: Study of the reactions of an ethnic group of residual type to the challenge of the intensive introduction of the monetary economy in the form of a development of speculative cultivations by allochthonous immigrants.

Approach: Social anthropology of the Gban group. Study in a historical perspective of the economic anthropology of the Gagou people. Studies of the immigration and of the social relations between original inhabitants and immigrants. Study of the relations between land questions and agrarian structures.

Results: Publications.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

DIVISIONS CTFT D'ABIDJAN

B.P. 8033, Abidjan

4.0083, PHENOLOGY AND ECOLOGY OF THE SIPO (ENTANDROPHRAGMA UTIL) - RHYTHM OF GROWTH IN NATURAL FOREST

DELAUNAY, (IV.041.0001)

Objective: The sipo is an important species in plantation at present. Its conditions of growth in natural forest are to be specified.

Approach: Continuous study of the growth with dendrometers. Phenological observations. Study of the growth rings after felling.

Results: Preliminary information on the reading of the rings (anatomy division). Setting up of dendrometers in 1972 and start of phenological observations.

Only provisional internal reports to the C.T.F.T. of the Ivory Coast have appeared.

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

4.0084, EXPERIMENTS ON SOURCES OF ORIGIN OF DIFFERENT SPECIES OF TREES FOR PLANTATION

DELAUNAY, (IV.041.0002)

Objective: Increase the productivity of forestry plantations by improvement of the planting material.

Approach: To obtain a better genetic advantage in forestry improvement. The indications are to follow the following stages: selection at the level of source of origin; selection of the best phenotypes; individual selection. At present we are at the stage of comparing sources of origin for the following species: teak, Terminalia superba, Tavoronsis, pine, Cedrela, Eucalyptus.

Results: First results on the experiments set up in 1969 (Cedrela).

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

4.0085, STUDY OF THE BORER OF THE MELIACEAE - HYPSIPYLA ROBUSTA (MOORE)

M. MALAGNOUX, (IV.041.0003)

Objective: Knowledge of the parasite, the present limiting factor in plantations of Khaya ivorensis in the Ivory Coast.

Approach: Silvicultural method of control. Chemical method of control: protection of nurseries study the different parasites of the borer.

Results: Regulation of the light in plantation reducing the level of attack. Protection of nurseries by chemical control. Knowledge of the life-cycle of the Borer. Determination of several Hyp-parasites.

IVORY COAST

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

4.0086, PROMOTION OF ABUNDANT COMMERCIAL SPECIES OF WHICH LITTLE USE IS MADE
L. VERGNET, (IV.041.0004)

Objective: Development by exploitation of species that are little used at present, bearing in mind the richness of the forest in principal known species.

Approach: Making out a list of species to be promoted. Synthesis of knowledge acquired on these species. Creation of a Technology Laboratory. Carrying out of experiments (physical, mechanical, industrial yield). Completion on the spot or by sending of samples.

Results: Technical memoranda established for a part of the woods to be promoted.

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

ESSAIS IFCC DE TOMBOKRO

B.P. 1827, Abidjan

4.0087, IRRIGATION OF THE CACAO-TREE
J. SNOECK, (IV.135.0001)

OBJECTIVE: Cultivation of the cacao-tree in regions of marginal rainfall within the framework of the development of the approaches to the Kassou Dam in the valley of the Bandama.

APPROACH: Comparison of the productions of irrigated and non- irrigated fields.

RESULTS: Favourable on the development of young cacao-trees. No production as yet (plantation 1970).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0088, IRRIGATION OF THE COFFEE-SHRUB
J. SNOECK, (IV.135.0002)

OBJECTIVE: Cultivation of the coffe-shrub in regions of marginal rainfall within the framework of the development of the approaches to the Kossou Dam in the valley of the Bandama.

APPROACH: Comparison of the productions of irrigated and non- irrigated fields.

RESULTS: Favourable on the development of young coffee-shrubs. No production as yet (plantation 1971).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0089, MINERAL FERTILIZATION ON COFFEE
J. SNOECK, (IV.135.0003)

Network project - see IV. 132.0032 (4.0145)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0090, MINERAL FERTILIZATION ON COCOA
J. SNOECK, (IV.135.0004)

Network project - see IV. 132.0033 (4.0146)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

FERME DES CULTURES IRRIGUEES DE TOMBOKRO IRAT

B.P. 12, Yamoussoukro

4.0091, REQUIREMENTS IN WATER OF IRRIGATED CROPS
J. RIDDERS, (IV.024.0001)

Objectives: To determine the water requirements of the following crops: 1) annuals: rice - maize - cotton; 2) perennials: forage crops - cacao-trees - coffee-shrubs - oil palm tree - coconut palms - rubber trees - pineapples.

Establishment of a method of obtaining a warning when more irrigation is necessary by means of a simple measure (for example: evaporation in a vat).

Approach: Measurement of climatic characters. Measurement of evapotranspiration by the Gazon ETM. Measurement of the actual and maximal moisture consumption with the aid of the neutron humiditimeter.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0092, DETERMINATION OF SOIL CHARACTERISTICS FOR IRRIGATION
J. RIDDERS, (IV.024.0002)

Objecive: To determine the maximal rates of irrigation to be applied on the principal types of soil as a function of the crop and of its stage of growth or development. Rates and frequencies of irrigation to be applied to the crops according to the type of soil.

Approach: Determination of the useful moisture Reserve of soils: apparent density, capacity in the field, wilting point.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0093, INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS
H. MERLIER, (IV.024.0003)

National network project: See IV. 021.0050. (4.0206)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0094, CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE
G. RENAUT, (IV.024.0004)

National network project: See IV. 021.0049. (4.0205)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

PLANTATION EXPERIMENTALE IRHO

Robert Michaux, B.P. 8, Dabou

4.0095, FUSARIOSIS OF THE OIL PALM TREE - SELECTION OF RESISTANT MATERIAL
R.J. RENARD, (IV.074.0001)

Objective: General improvement of the behaviour of the progeny subjected to fusariosis.

Approach: 1. Inoculation with Fusaraum oxysporum f.op. elaei of young palm plants in a nursery - each year 200 progeny tested. 2. To define the best conditions for inoculation. 3. To enumerate percentage of diseased plants - classification of progeny and of parents. 4. Comparison of result of test with behaviour in

the field. 5. Test of progeny resulting from self-fertilization of resistant parents.

Results: 1. 32 DURA, 11 TENERA and 21 PISIFERA transmit a good resistance. Crosses between resistant parents are themselves resistant. Behaviour of progeny of parents originating from self-fertilization of resistant palms is being studied (50% of resistant individuals?). 2. Very good correlation results of the test with those in the field. 3. Utilization of a very aggressive strain for the test. 4. Resistance of the polygenic type.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0096, CONTROL OF BLAST OF THE OIL PALM TREE
R.J. RENARD, (IV.074.0002)

Objective: To find a means of protection against blast during the critical period.

Approach: 1. To reproduce the disease by inoculation of Pythium and Rhizoctonia, presumed agents of the disease. 2. Studies of external conditions (irrigation - shade - soil). 3. Control with fungicides. 4. Hypothesis of a virus or mycoplasma (as possible causal agents) is also envisaged.

Result: Shade generally prevents the appearance of the disease. The cost and the difficulty of providing it in certain situations prompt us to search for other means of control.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0097, CERCOSPORIOSIS OF THE OIL PALM TREE
R.J. RENARD, (IV.074.0003)

Objectives: 1. To determine an effective means of control of Cercosporiosis of the oil palm in nurseries. 2. Similarly, to define a method for control of the disease of plantations of Elaeis melanococca.

Approach: 1. To define the degree of infection of the palm tree. 2. Campaign with fungicides, either contact or systemic. 3. Inoculation experiments - to define the optimal conditions for development of the disease.

Results: Control with fungicides in nurseries is possible but not perfect, in plantations on palm trees of 2 - 3 years of age it is ineffective.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

STATION CENTRALE IFCC DE DIVO

B.P. 176, Divo

4.0098, STUDY ON MANUAL POLLINATION AND FERTILIZATION OF THE CACAO-TREE AND THE INFLUENCE OF A COMPLEMENTARY MANUAL POLLINATION
J. BESSE, (IV.131.0001)

Network project : see IV. 132.0001. (4.0117)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0099, STUDY OF THE TRAINING (PRUNING) OF THE COFFEE-SHRUB ROBUSTA
J. CAPOT, (IV.131.0002)

Network project - see IV. 132.0002. (4.0118)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0100, STUDY OF DENSITIES AND ARRANGEMENTS FOR PLANTATION OF THE CACAO-TREES
J. CAPOT, (IV.131.0003)

Network project - see IV. 132.0003. (4.0119)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0101, GENERATIVE IMPROVEMENT OF THE CACAO-TREE
J. BESSE, (IV.131.0004)

Network project - see IV. 132.0004. (4.0120)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0102, VEGETATIVE IMPROVEMENT OF THE CACAO-TREE
J. BESSE, (IV.131.0005)

Network project - see IV. 132.0005. (4.0121)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0103, IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY VEGETATIVE MEANS
J. CAPOT, (IV.131.0006)

Network project - see IV. 132.0006. (4.0122)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0104, IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY GENERATIVE MEANS
J. CAPOT, (IV.131.0007)

Network project : see IV. 132.0007. (4.0123)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0105, IMPROVEMENT OF COFFEE-SHRUBS BY INTRASPECIFIC HYBRIDATION
J. CAPOT, (IV.131.0008)

Network project - see IV. 132.0008. (4.0124)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0106, STUDY OF DENSITIES AND ARRANGEMENTS IN PLANTATION OF THE COFFEE-SHRUB ROBUSTA
J. CAPOT, (IV.131.0009)

Network project - see IV. 132.0009. (4.0125)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0107, RESEARCH FOR HYBRID VARIETIES OF CACAO HAVING A GOOD APTITUDE FOR SETTING AND A HIGH DEGREE OF TOLERANCE FOR DROUGHT
J. BESSE, (IV.131.0010)

Network project - see IV. 132.0010. (4.0126)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0108, PHYTOTECHNICAL (METHODS OF PLANTATION) AND AGRO-ECONOMIC STUDIES ON THE CACAO-TREE
J. BESSE, (IV.131.0011)

Network project - see IV. 132.0011 (4.0127)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0109, TECHNOLOGICAL STUDIES ON THE COMMERCIAL QUALITIES OF THE CLONES AND HYBRIDS OF

IVORY COAST

CACAO TREES UTILIZED IN THE SELECTION PROGRAMME

J. BESSE, (IV.131.0012)

Network project - see IV. 132.0012 (4.0128)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0110, RESEARCH ON CACAO CLONES OR INTERCLONAL HYBRIDS PRESENTING A "DISTINCT" TOLERANCE TO PHYTOPHTORA PALMIVORA

J. BESSE, (IV.131.0013)

Network project - see IV. 132.0013 (4.0129)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0111, STUDY OF THE RESPONSE OF ELITE HYBRID CACAO-TREES TO MINERAL FERTILIZATION

J. BESSE, (IV.131.0014)

OBJECTIVE: To study the increase in yield of the elite hybrids as a result of the application of fertilizers, in the case of plantations managed under regrowth and then in full sunlight, according to different basic climatic conditions.

APPROACH: These experiments are implanted on progeny tests, either in course of production, or from the first year of plantation. Implantation according to an experimental arrangement as a split-plot. Study of the total effect on the whole group of hybrids and of the individual effect on each hybrid.

RESULTS: Increases in yields of the whole group of hybrids of 25 to 35% are observed. Certain lines of descent are doubling their yield.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0112, MINERAL FERTILIZATION ON COFFEE

J. SNOECK, (IV.131.0015)

Network project - see IV. 132.0032 (4.0145)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0113, MINERAL FERTILIZATION ON COCOA

J. SNOECK, (IV.131.0016)

Network project - see IV. 132.0033 (4.0146)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0114, IMPROVEMENT OF THE COLA TREE - COLA NITIDA

J. CAPOT, (IV.131.0017)

Network project - see IV. 132.0027 (4.0140)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0115, UTILIZATION OF HERBICIDES IN COFFEE CROPPING

J. SNOECK, (IV.131.0018)

OBJECTIVES: Labor saving. Study on the impact of herbicides on growth and production.

APPROACH: Trials with different types of herbicides - singly, combined or in alternate applications.

RESULTS: Reduction of labor without notable change in total costs of cultivation. Growth stimulation of young coffee plants compared with traditional weeding techniques (manual cutting).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0116, UTILIZATION OF HERBICIDES IN COCOA CROPPING

J. SNOECK, (IV.131.0019)

OBJECTIVES: Labor saving study on the impact of herbicides on growth and production.

APPROACH: Trials with different types of herbicides, singly, combined and in alternate applications.

RESULTS: Reduction of labor without notable change in total costs of cultivation.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

STATION EXPERIMENTALE IFCC DE BINGERVILLE

B.P. 1827, Abidjan

4.0117, STUDY ON MANUAL POLLINATION AND FERTILIZATION OF THE CACAO-TREE AND OF THE INFLUENCE OF A COMPLEMENTARY MANUAL POLLINATION

J. BESSE, (IV.132.0001)

OBJECTIVES: To verify if natural pollination is a limiting factor of production for a plantation of selected hybrid cacao-trees and for the Biclonal Seeding Fields. To study the influence of a complementary manual pollination on the total production of the trees and the drying of the seeds ("cocoa beans"). To study a practical and not too onerous method of manual pollination.

APPROACH: Constitution of pairs "treated by manual pollination/control" of selected high-producer hybrids and of female parents from the Biclonal Seeding Fields. Observations on wilt and counts of the pods harvested. Observations on fertilization. Study of the grouping of the yields in Biclonal Seeding Fields. Economic balance of manual pollination.

RESULTS: Experiments in progress.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0118, STUDY OF THE TRAINING (PRUNING) OF THE COFFEE-SHRUB ROBUSTA

J. CAPOT, (IV.132.0002)

OBJECTIVE: To establish a method of pruning, as simple as possible and ensuring a regular cropping, without any interruption and preserving the long-term productive potential.

APPROACH: Establishment of comparative pruning experiments: shaping of the young trees; methods of pruning; number of stems per shrub.

RESULTS: To plant coffee-shrubs at an inclination of 30 degrees from the vertical. (To encourage the spontaneous emission of young shoots at the tree base). To apply the pruning method known as "quinquennial" which consists in: training the coffee-shrubs on 4 stems (minimum) - 5 stems probably constituting the optimal number; to carry out the first close pruning, on descent of the sap, at 7 years, then every 5 years. (Modalities adapted to the recommended density of 1,320 coffee-shrubs per hectare).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0119, STUDY OF DENSITIES AND ARRANGEMENTS FOR PLANTATION OF THE CACAO-TREES
J. CAPOT, (IV.132.0003)

OBJECTIVE: Research on the planting distances between cacao-trees ensuring the highest production per surface unit.

APPROACH: Establishment of comparative density experiments.

RESULTS: 3 x 2.5 metres, or 1,320 cacao-trees per hectare, general recommendation. At Abengourou, the density of 3 x 2 m is superior to 3 x 2.5 m (plus 11%).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0120, GENERATIVE IMPROVEMENT OF THE CACAO-TREE
J. BESSE, (IV.132.0004)

OBJECTIVE: The obtaining of selected, vigorous, high-producer hybrids, presenting a high degree of tolerance to the known hazards, and satisfactory commercial qualities.

APPROACH: Constitution of collections starting from trees marked in the Ivory Coast and from introduced clones or populations. Choice of heads of clones. Creation of interclonal hybrids by manual controlled pollinations. Testing of hybrids in comparative experiments: randomized Fisher blocks with 4, 6 or 12 repetitions. Statistical interpretation of the results. Reconstitution of the selected hybrids in the Biclonal Seeding Fields and distribution of the hybrid pods.

RESULTS: 500 hybrids (UPA x Amelonado or Trinitario) undergoing testing yields 1. 3 T on average. 100 elite hybrids retained for Local Adaptation Tests yields 1.8 T on average. 12 selected hybrids, reconstituted in Biclonal Seeding Fields yields on average 2.3 T. cacao/hectare in experiment.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0121, VEGETATIVE IMPROVEMENT OF THE CACAO-TREE
J. BESSE, (IV.132.0005)

OBJECTIVE: The obtaining of selected, vigorous, high-producer clones presenting a high degree of tolerance to hazards and having satisfactory commercial qualities.

APPROACH: Constitution of collections from trees marked in the Ivory Coast (notably in progeny tests) and from introduced clones or populations. Choice of heads of clones, which are afterwards multiplied vegetatively by means of cuttings in a propagation enclosure. Testing of clones in comparative experiments. Statistical interpretation of the results. Popularization by cuttings of the selected clones.

RESULTS: 84 clones undergoing testing. The 20% heading the classification constitute the elite clones.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0122, IMPROVEMENT OF THE COFFEE-SHRUB (C.CANEPHORA) BY VEGETATIVE MEANS
J. CAPOT, (IV.132.0006)

OBJECTIVE: Augmentation of yields. Resistance to climatic and biological hazards. Research for a better commercial quality.

APPROACH: Prospecting and introductions of plant material. Installation of collections. Establishment of clonal experiments for selection, for confirmation and multilocal. Creation of propagation enclosures. Multiplication by cuttings and propagation of the elite clones.

RESULTS: The obtaining of clones highly productive of a good quality of coffee. Propagation in progress throughout the whole of the coffee-growing zone.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0123, IMPROVEMENT OF THE COFFEE-SHRUB (C.CANEPHORA) BY GENERATIVE MEANS
J. CAPOT, (IV.132.0007)

OBJECTIVE: Augmentation of yields. Resistance to climatic and biological hazards. Research for a better commercial quality.

APPROACH: Prospecting and introductions of plant material. Installation of collections. Establishment of comparative experiments to test general aptitude for combination ("rogue" progeny) (phase 1). Crossings between the best parents detected by the issue of phase 1. Establishment of comparative experiments to test specific aptitude for combination (legitimate progeny) (phase 2). Creation of oligoclonal seed-production fields reproducing the best combinations detected by the issue of phase 2. Propagation of selected seeds.

RESULTS: Obtaining descendants having a high production of a good quality coffee,

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0124, IMPROVEMENT OF COFFEE-SHRUBS BY INTRASPECIFIC HYBRIDATION
J. CAPOT, (IV.132.0008)

OBJECTIVE: Creation of hybrid varieties (ARABUSTA) combining the organoleptic quality of C. arabica with the rusticity and the productivity of C. canephora at zones of low altitude.

APPROACH: The obtaining of clones and tetraploid descendants of C. canephora. Introduction of forms and cultivars of C. arabica. Selection of parents in the two groups. Carrying out hybridations between C. canephora tetraploid (T) and C. arabica (A): the obtaining of descendants of A x T and T x A. Selection from among hybrid descendants and multiplication by means of cuttings: obtaining of clones. Installation of multilocal clonal experiments with ARABUSTA. Creation of propagation enclosures with the best ARABUSTA clones. Propagation.

RESULTS: Obtaining of ARABUSTA clones having satisfactory production of a coffee with very large berries and with greatly improved organoleptic qualities as compared with the Robusta variety.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0125, STUDY OF DENSITIES AND ARRANGEMENTS IN PLANTATION OF THE COFFEE-SHRUB ROBUSTA
J. CAPOT, (IV.132.0009)

OBJECTIVE: Research on the intervals between coffee-shrubs and on the arrangement of the rows (equidistant, paired) ensuring the highest production per surface unit.

APPROACH: Establishment of comparative experiments on densities and arrangements in plantation with or without leguminous cover and with or without strawing.

RESULTS: 3 x 2.5 metres, or 1,320 coffee-shrubs per hectare. When use is made of Flemingia congesta between the rows (a leguminous plant mown every three months for use as straw) it will probably be advantageous to adopt an arrangement in paired rows (4 plus 2) x 2.5 m in triangle, or 1,320 coffee-shrubs per hectare, the Flemingia being cultivated in the wide interval between rows.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

IVORY COAST

4.0126, RESEARCH FOR HYBRID VARIETIES OF CACAO HAVING A GOOD APTITUDE FOR SETTLING AND A HIGH DEGREE OF TOLERANCE FOR DROUGHT
J. BESSE, (IV.132.0010)

OBJECTIVE: Research among selected interclonal hybrids for vigorous and hardy F1 generations, good at establishing themselves in severe conditions and tolerant to drought.

APPROACH: Planting of hybrids in full sunlight, without lateral or apical protection, and without strawing. Limited phytosanitary surveillance. Counting of the dead trees per F1 and measuring of the vegetative development.

RESULTS: Popularization of the best adapted hybrids in zones where basic conditions, particularly those of climate, are marginal.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0127, PHYTOTECHNICAL (METHODS OF PLANTATION) AND AGRO-ECONOMIC STUDIES ON THE CACAO-TREE
J. BESSE, (IV.132.0011)

OBJECTIVES: To establish cultural methods adapted to the new hybrid varieties and enabling the full exteriorization of the productivity potential. To establish an economic balance of the various methods recommended.

APPROACH: Experiments on methods of planting and comparison of the yields, under regulated forest for one portion, under natural re-growth, then full sunlight for another portion. Studies of cultivation methods associating food crops with the cacao plantation. Planting and managing cacao-trees conditions of an industrial plantation. In each experiment, study costs and net price.

RESULTS: The elimination of shade is tolerated by hybrids of parents from the High Amazon and entails a distinct increase in the yields. The first results leave room for hope for a positive balance from the economic point of view for this new method. The association with food crops is possible under certain conditions.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0128, TECHNOLOGICAL STUDIES ON THE COMMERCIAL QUALITIES OF THE CLONES AND HYBRIDS OF CACAO TREES UTILIZED IN THE SELECTION PROGRAMME
J. BESSE, (IV.132.0012)

OBJECTIVES: To study the physical, chemical and organoleptic qualities of the clones used as parents, and of the elite hybrids obtained in selective breeding. To estimate certain characteristics of these clones and hybrids.

APPROACH: The obtaining of samples by microfermentation. Test physical qualities (in the Ivory Coast, notably the dry weight of a bean). Test chemical qualities (content in oily matter, acidity, pH, etc.) and organoleptic qualities in the I.F.C.C. Laboratory of Technology at Nogent. The obtaining of sufficiently important samples to be treated by industrial or semi-industrial methods by manufacturers. Study the variability and the homogeneity of the commercial product.

RESULTS: Elimination of the clones or hybrids not giving satisfaction. Obtaining characteristics enabling the calculation from number of pods/hectare of the weight of commercial cacao/-hectare in a precise manner for each hybrid.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0129, RESEARCH ON CACAO CLONES OR INTERCLONAL HYBRIDS PRESENTING A DISTINCT TOLERANCE TO PHYTOPHTHORA PALMIVORA
J. BESSE, (IV.132.0013)

OBJECTIVE: Research on clones or hybrids tolerant to P. palmivora in experimental conditions in the field.

APPROACH: Counts of black pods on experimental plots. Introduction of clones considered to be tolerant in their country of origin. Creation of hybrids between tolerant clones. Obtaining self- fertilized descendants from tolerant clones in such a manner as to single out in the F1 generation some trees presenting reinforced characteristics of tolerance. Test these descendants by inoculation, in collaboration with the laboratory of Phytopathology.

RESULTS: Elimination of parent clones or hybrids that are more susceptible than Forestero Amelonado to Phytophthora palmivora.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0130, ECOPHYSIOLOGICAL RESEARCH ON THE COFFEE-SHRUB
J. SNOECK, (IV.132.0015)

Objective: Research on correlations between production and climatic factors.

Approach: Setting up a network of climatological stations studying temperature, insulation, evaporation and rainfall.

Observations on the annual growth cycle of coffee-shrubs.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0131, ECOPHYSIOLOGICAL RESEARCH ON THE COCOA-SHRUB
J. SNOECK, (IV.132.0016)

Objective: Research on correlations between production and climatic factors.

Approach: Setting up a network of climatological stations measuring temperature, insulation, evaporation and rain.

Observations on monthly productions of cocoa-shrubs.

Results: Definition of relations between monthly productions and the rain, insulation and evaporation of the preceding months. Specification of the importance of each one of these climatic factors.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0132, STUDY ON THE UTILIZATION OF GROWING SUBSTANCES IN COCOA CROPPING
J. SNOECK, (IV.132.0017)

OBJECTIVES: Reduction in young fruit drop. Acceleration of crown formation of cocoa trees.

APPROACH: Trials with growth delaying substances.

RESULTS: Preliminary results: favourable effect of B9 on the crown formation (dimethy-hydrozide succinic acid).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0133, STUDY ON THE UTILIZATION OF GROWTH SUBSTANCES IN COFFEE CROPPING
J. SNOECK, (IV.132.0018)

OBJECTIVE: Reduction in young fruit-drop. Shortening harvesting period.

APPROACH: Trials with growth delaying substances. Trials with abscisin chemicals.

RESULTS: Preliminary results. Concentration of maturation period by the use of Ethrel (ETHEPHON).

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0134, STUDY THE ATTRACTIVITY OF PLANT MATERIAL TO THE NOCTURNAL MOTH OF THE CACAO-TREE - EARIAS BIPLAGA

J. NGUYENBAN, (IV.132.0019)

Objective: Field observations on the behaviour of 3 clones and of 3 hybrids of High-Amazonian origins with regard to attacks by Earias biplaga (WIK).

Approach: The block comprises 12 component plots: 6 of cuttings and 6 of hybrids.

Each clone or each hybrid is represented by 12 useful trees planted entirely at random on the inside of the component plot. Total surface area: 0.5 hectare.

Results: Demonstration that one clone has obtained a characteristic of tolerance linked to foliar morphology.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0135, STUDY THE RESISTANCE OF 6 HIGH-AMAZONIAN HYBRIDS TO MESOHOMOTOMA TESSMANI - A JUMPING PLANT LOUSE OF THE CACAO-TREE

J. NGUYENBAN, (IV.132.0021)

Objective: Field observations on the behaviour of 6 elite hybrids in response to the bites of the jumping plant louse, Mesochomotoma tessmani (Aulm).

Approach: The block comprises 6 component plots planted with High- Amazonian hybrids. Each hybrid is represented by 6 trees in completely random arrangement in the component plot.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0136, ECOLOGICAL STUDY OF THE CACAO-TREE IN RELATION TO BLACK-POD

M. TARJOT, (IV.132.0022)

Objective: The object was to see how the potential inoculum (soil and floral cushions) varied as a function of microclimates, and on the other hand, what was the importance of the losses as a function of microclimates.

Approach: The parasite has been trapped during different periods of the year and in different geographical situations. On the other hand, by means of recording hygrometers, it has been possible to define the "tampon ability" of a cacao-tree, i.e., its faculty of attenuating variations in relative humidity.

Results: It has been possible to prove: that the parasite was present in very varied sites on the cacao-tree, but that the potential inoculum was higher in humid microclimates; that definite correlations exist between importance of the losses and "tampon ability".

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0137, STUDY OF THE COMPOSITION OF THE CORTEX OF THE PODS IN RELATION TO RESISTANCE TO BLACK-POD

M. TARJOT, (IV.132.0023)

Objective: The object was to see, by appropriate analyses, if differences between the composition of the cortex of susceptible pods and that of resistant pods could be proved.

Approach: The first analyses dealt with the moisture content of the tissues of the pericarp in different conditions, then the content in mineral elements was studied. Study of the content in glucides is in progress, and the study of the polyphenols is about to be started.

Results: It can be proved: that the increase in the water content of the tissues correlated with the increase in susceptibility; that each time the susceptibility increased, there was a noticeable decrease in the calcium content and an increase in the potassium content.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0138, TREATMENT OF COFFEE AT THE CROP-HUSBANDRY STAGE

M. RICHARD, (IV.132.0025)

Objective: Improvement of solar dying of coffee berries.

Approach: Comparison of several types of sun-drying apparatus.

Results: Adaptation of a drying apparatus known as "basculant" (a "rocker" or "see-saw").

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0139, STRENGTHENING THE RESISTANCE OF CACAO-TREES TO THE BLACK PODS DUE TO PHYTOPHTHORA PALMIVORA

M. TARJOT, (IV.132.0026)

Objective: As no cacao-tree has revealed a total resistance to the resistance to the parasite during the whole year, the object is to attempt to increase these characters of partial resistance.

Approach: The attempts at improvement are being made in two directions: the genetic method: self-fertilizations or crossings are carried out on the most interesting trees. The study of the descendants will reveal whether it has been possible to obtain trees whose behaviour is better than that of the parents.

These trees have been chosen after study of strains of the parasite present in the Ivory Coast and after study of resistance following some experimental inoculations from 1963 to 1971.

The chosen trees present characters of more or less pronounced resistance for about 9 months of the year; but during about 3 months a general susceptibility is noted.

The physiological method: as environmental conditions play an important role in the behaviour of cacao-trees, some experiments on density and on shade have been set up to study their influence upon the resistance of the trees.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0140, IMPROVEMENT OF THE COLA TREE - COLA NITIDA

J. CAPOT, (IV.132.0027)

OBJECTIVE: Increase the production of good quality nuts in the cola tree.

APPROACH: Survey and introduction of plant material. Establishment of collections for observation. Installations of clonal experiments and tests on legitimate and illegitimate progeny. Creation of propagation enclosures and seeding fields.

RESULTS: Method for vegetative propagation. Method for manual pollination.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0141, PEDOLOGICAL-AGRONOMIC STUDIES WITH REGARD TO THE CACAO TREE

P. JADIN, (IV.132.0028)

OBJECTIVES: To determine the characteristics of soils suitable for the cultivation of the cacao tree. To determine, for the Ivory Coast, the surface areas that can be planted with cacao trees.

APPROACH: Pedological surveys. Mapping of the soils. Laboratory analyses.

RESULTS: Definition of the characteristics of soils suitable for the cultivation of the cacao tree. Approximate evaluation of the surface areas that can be planted with cacao trees.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0142, PEDOLOGICAL-AGRONOMIC STUDIES WITH REGARD TO THE COFFEE TREE
P. JADIN, (IV.132.0029)

OBJECTIVES: To determine the characteristics of soils suitable for the cultivation of the cacao tree. To determine, for the Ivory Coast, the surface areas that can be planted with cacao trees.

APPROACH: Pedological surveys. Mapping of the soils. Laboratory analyses.

RESULTS: Definition of the characteristics of soils suitable for the cultivation of the cacao tree. Conduct on evaluation of the surface areas that can be planted with coffee trees.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0143, HAPLOIDY IN THEOBROMA CACAO
P. DUBLIN, (IV.132.0030)

OBJECTIVES: Establishment and utilization of haploid plants for cocoa breeding.

APPROACH: Research on haploid induction techniques applicable to Theobroma cacao.

RESULTS: Establishment of haploid plants through polyembryonic dissociation of Theobroma cacao.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0144, FIELD TRIALS ON PESTICIDES AGAINST COCOA MIRIDS
J. NGUYENBAN, (IV.132.0031)

OBJECTIVES: Research on insecticide treatments at ultra low volume (ULV) against cocoa Mirids.

APPROACH: Comparative trials in cocoa plantation on flat units of 2.500m2 in which 25 trees are completely enclosed. Trials with 10 replications for each product. 20 specific products have been tested.

RESULTS: Thiodan 18 (endosulfan) has an average effectiveness of 98.6% against cocoa Mirids.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0145, MINERAL FERTILIZATION ON COFFEE
J. SNOECK, (IV.132.0032)

OBJECTIVES: Increasing yields.

APPROACH: Fertilizer trials in nurseries. Fertilizer trials on young coffee plants during their vegetation growing period. Fertilizer trials on coffee in production plantation.

RESULTS: Nurseries: Stimulation of young plant development by application of a balanced NPK formula. Vegetative phase: favourable effect of N. Production phase: favourable effect of PK on schist derived soils; favourable effect of NPK on the other types of soil of the Ivory Coast.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0146, MINERAL FERTILIZATION ON COCOA
J. SNOECK, (IV.132.0033)

OBJECTIVES: Increasing of yields.

APPROACH: Fertilizer trials in nurseries. Fertilizer trials on young cocoa plants during their vegetative growing period. Fertilizer trials on cocoa in production plantation. Study and establishment of soil diagnostic techniques.

RESULTS: Nurseries: stimulation of young plant development by application of NP. Vegetative phase: favourable effect of supplement of P and N. Production phase: favourable effect of NPK formula. Soil diagnostic: calculation of balanced NPK Ca Mg fertilizer formula based on soil chemical analysis. These formula aimed at the establishment of defined soil equilibrium between: exchangeable bases and total N, total N and total P, and K - Ca - Mg ratios expressed in % of total exchangeable bases.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

STATION IFAC D'AGUEDEDOU

B.P. 1740, Abidjan

4.0147, PINEAPPLES - PHYSIOLOGICAL STUDIES
J.J. LACOEUILHE, (IV.112.0001)

OBJECTIVE: To improve the efficacy of fertilization. To obtain more complete mastery of the plant's behaviour. To eliminate certain physiological changes in the fruit.

APPROACH: Studies on the growth and development of the plant (1971). Studies of the mineral requirements of the plant as a function of its age and of the climatology (1971). Study of florigenic preparations which control the maturation of the fruit (1966). Research on the internal brown discoloration of the flesh (1971).

FIRST RESULTS: Establishment of foliar diagnosis "a posteriori" (by analyses of "D" leaves sampled at the moment of the treatment for flowering) and serving for the next crop (in succession). Establishment of increasing fertilization. Establishment of techniques for the control of flowering and for the maturation of the fruit.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0148, TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES
J. GODEFROY, (IV.112.0002)

OBJECTIVE: To avoid the degradation of soils by continuous cultivation of pineapples.

APPROACH: Evolution of soils under continuous cultivation of pineapples (1960). Study of fallows (1964). Lixiviation of soils under cultivation of pineapples (1969).

FIRST RESULTS: Establishment of techniques to limit degradation of soils (control of erosion, limitation of the desaturation in cations).

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0149, PINEAPPLES - PHYTOSANITARY PROTECTION
P. FROSSARD, (IV.112.0003)

OBJECTIVE: Control of the parasites of the crop to increase the yield.

APPROACH: Study of the influence of nematodes on the growth of the plant (1961). Study of the effect of scale insects on wilt of the plant (1965). Study of Phytophthora spp. (1965). Studies of the Penicillium and Fusarium species affecting fruit (1970 - 1971). Study of the occurrence of weed species (1958).

FIRST RESULTS: Establishment of techniques for the control of nematodes and of scale insects. Establishment of techniques

for the control of Phytophthora. Establishment of techniques for chemical weed destruction.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0150, PINEAPPLES. IMPROVEMENT OF THE PLANT - INTERACTION BETWEEN PLANT AND ENVIRONMENT
J.J. LACOEUILHE, (IV.112.0004)

OBJECTIVE: To adapt the cultivation of the pineapple to the local ecological conditions and to the principal economic objectives sought. Fruits weighing from 1.300 kg to 1.500 kg for exportation as fresh fruit. Fruits weighing from 1.800 kg to 2.00 kg for manufacture of preserves.

APPROACH: Genetic selection of the plant material (1958). Study of the cycle of the plant as a function of climatic and microclimatic data (1962). Study of the variations in quality in the course of the season (1965).

FIRST RESULTS: The obtaining of a homogeneous plant material corresponding to the economic requirements. Establishment of the crop in certain ecological conditions.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

STATION IFAC D'AZAGUIE

B.P. 1740, Abidjan

4.0151, IMPROVEMENT OF THE BANANA PLANT
J. GUILLEMOT, (IV.111.0001)

OBJECTIVE: To determine the possible improvements of genetic or phytotechnical order according to the ecological conditions of the Ivory Coast.

APPROACH: Comparison of the production potential of new selected cultivars, with the current types: susceptibility of the cultivar to the enemies of cultivation, growth and development of the vegetative succession, effect of the light factor and efficient photosynthesis, evolution of the dimensions of the inflorescences and of the fruits, competition between shoots and racemes, development of the racemes. Analysis of the microclimatic factors.

RESULTS: Obtained: definition of a method for assessing development based on the elongation of the leafsheaths and the growth of the roots. Definition of a method for assessing development based on the elongation of the leafsheaths and the growth of the roots. Definition of the value of the "American" cultivar. Awaited: definition of the realizable margin of progress.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0152, INFLUENCE OF MINERAL FERTILIZATION ON THE GROWTH OF BANANA PLANT AND THE METABOLISM OF SUGARS
J. GUILLEMOT, (IV.111.0002)

OBJECTIVE: Determination of the influence of mineral fertilization on the growth, the development and the metabolism of sugars.

APPROACH: Study of the penetration into the plant and of the migration in it of exogenous and endogenous substances. Interaction of external conditions and of mineral elements (influence on the composition of the pulp). Study of fertilizers adapted to particular conditions, relations between fertilization and the content of the organs in mineral elements, metabolic influences.

RESULTS: Obtained: establishment of techniques for fertilization adapted to different regions of production. these techniques, as a function of the stages of development of the plant and of the external conditions; reduction of abnormalities.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0153, EVOLUTION OF THE SOILS OF BANANA PLANTATIONS. CULTIVATION IN ORGANIC SOILS
J. GUILLEMOT, (IV.111.0003)

OBJECTIVE: Study of the evolution of the soils of banana plantations, definition of the techniques for cultivation in organic soils.

APPROACH: Evolution of the physical and chemical characteristics of the soils, evolution of the organic material, of humus, of nitrogen (1958). Lixiviation of the fertilizing elements, influence of organic and mineral amendments (alkalizing and acidifying) (1967). Research on the interactions of fertilization and of parasitism (1968). In organic soils: pedological study of the support, influence of drainage on the root development, correction of acidity and of deficiencies, study of the evolution of the organic matter (1970).

RESULTS: Obtained: establishment of fertilizations adapated to the type of soils and to the effects of the climate (amount of rain, temperature). Awaited: definition of the diagnostic elements enabling a regulated fertilization.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0154, INTEGRATED CONTROL OF THE PARASITES AND MARAUDERS OF THE BANANA PLANT
P. FROSSARD, (IV.111.0004)

OBJECTIVE: Elimination of the factors of parasitism, in an integrated control programme.

APPROACH: Definition of the influence of parasites and marauders upon the onset of degeneration of the plant material and the reduction of the yields. Levels that can be tolerated. Trials of new pesticide preparations. Ecology of Cladosporiosis; variability of the sign of mosaic in slips (cuttings) (1970). Influence on the yields, of attacks by nematodes (1960). Study of the systemic effects of the new formulations of fungicides and nematocides (1968).

RESULTS: Obtained: Reduction in the incidence of parasitic affections by the establishment of effective techniques for their control. Awaited: Definition of the secondary effects of the treatments in order to avoid possible damage.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0155, STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST
J. BOURDEAUT, (IV.111.0005)

OBJECTIVE: Definition of the species of fruit crops adapted to the climate of the Lower Ivory Coast, of their performances, of the utilization of the products.

APPROACH: Specific experimental arrangements, situated in chosen mesoclimatic sites, for the study of the adaptability of species of fruit cultivated as homogeneous populations or as associations: avocado tree, papaw, mangosteen, guava, grenadilla (Passion fruit), mango, sapodilla, custard-appe (Anona).

RESULTS: Obtained: Definition of the techniques for multiplication of the avocado tree in order to obtain planting material free from contamination with Phytophthora cinnamo (cause of withering and decay of avocado plants). Definition of the techniques for cultivation of papaw (annual crop-preservation of the

genetic purity of the types introduced), of the mangosteen, grenadilla and guava trees. Awaited: Selection of a stock (for grafting) resistant to Phytophthora cinnamo for the avocado tree. Definition of the suitability for fruit trees of the different climatic zones of the Ivory Coast and of the cultivation techniques with a view to the creation of agro-industrial unit-types for production.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

4.0156, STUDY OF THE ADAPTATION OF CITRUS FRUIT TREES IN THE DIFFERENT CLIMATIC ZONES OF THE IVORY COAST

J. BOURDEAUT, (IV.111.0006)

OBJECTIVE: Development and diversification of the cultivation of citrus trees, still limited to the production of essential oils.

APPROACH: Study of the resistance to fungal disease agents (Phytophthora), elimination of viral factors and study of the resistance to virus diseases transmitted by insect vectors. Study of the behaviour of the different varieties in the diverse climatic zones (stocks for grafting and subjects - scions). Phytotechnical and entomological definitions. Pomological studies and quality of the essential oils.

RESULTS: Obtained: regeneration of the plant material, definition of the conditions of cultivation. Awaited: selection of the varieties adapted to the climatic conditions, development of the cultivation of citrus fruit trees, new uses for the fruits for human food and for industry.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Abidjan, I.C.

STATION IRAT DE BOUAKE

B.P. 635, Bouake

4.0157, STUDY OF THE GERMINATIVE CAPACITY OF WEED SEEDS

H. MERLIER, (IV.021.0001)

Objective: To obtain batches of seeds with a high capacity for germination for the study of the biology of weeds.

Approach: Test of germinative capacity as a function of the size of the seeds. Test of germinative capacity as a function of the presence and of the absence of floral sheath (Gramineae).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0158, BALANCE OF MINERAL ELEMENTS UNDER CULTIVATION - MAINTENANCE FERTILIZATION

P.F. CHABALIER, (IV.021.0002)

Objectives: To establish a balance of the elements in the course of cultivation.

Approach: Lysimetric study of the losses by lixiviation. Study of the elements removed by the crops. Determination of the minerals and organic matter applied. Possible degradation of the mineral elements applied by fertilization (phosphorus in particular).

Results: A preliminary, provisional balance has been worked out for the different outstations.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0159, IMPROVEMENT OF RICE (INDICA GROUP)

M. JACQUOT, (IV.021.0003)

Objective: Principal criteria for selection: relatively short height of the plants, resistance to drought, horizontal resistance to piriculariosis, range of vegetative cycles from 100 to 140 days.

Approach: Crossings between adapted varieties and tall varieties in the hope of some favourable transgressions. Crossings between adapted varieties and of the short variety. Genealogical selection in general, bulk plus singularity.

Results: A semi-dwarf line, the issue of a crossing between two adapted and tall varieties.

General weakness of the lines issuing from crossings or within Taichung Native 1 for horizontal resistance to piriculariosis.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0160, COLLECTION OF VARIETIES FOR THE PLUVIAL RICE-FIELDS

M. JACQUOT, (IV.021.0004)

Objective: Knowledge of the behaviour of rice in the pluvial system. Improvement of the genetic resources. Reserve of plant breeding stock.

Approach: Genealogical selection with self-fertilizations under paper bags. Sowing every year or storing in a cold room, as the case may be.

Results: General weakness of the varieties of the IRRI type in horizontal resistance to piriculariosis: early stock from Brazil and from Taiwan, varietal differences in susceptibility to borer insects, 520 varieties retained for the collection at end of 1972.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0161, HYBRIDATIONS BETWEEN VARIETIES OF RICE (INDICA AND JAPONICA)

M. JACQUOT, (IV.021.0005)

Objective: Advantage and modalities of using the japonica varieties in crossing with the indica varieties.

Approach: F2 generation important (20,000 plants at the minimum), genealogical selection and/or bulk.

Results: First crossings in 1972.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0162, MUTATIONS INDUCED IN RICE (INDICA VARIETY) FOR THE REDUCTION IN THE HEIGHT OF THE PLANTS

M. JACQUOT, (IV.021.0006)

Objective: Research on mutations for a shorter height of plants in an indica variety, while still conserving food erectness of the panicle.

Approach: Variety employed: 63-83 from Senegal, treatment of one initial batch of seeds with gamma rays.

Results: Cultivation of the T3 generation in 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0163, TESTS OF LINES OF PLUVIAL RICE FOR THEIR ECOLOGICAL ADAPTABILITY

M. JACQUOT, (IV.021.0007)

Objective: To select lines having a wide adaptability for pluvial cultivation in West Africa, or to select varieties having a good addaptability to particular ecological conditions.

Approach: Tests of behaviour starting from the F4 generation in different experimental stations in West Africa. Comparative

statistical experiments with the most interesting lines in these stations.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0164, SELECTION FOR A STRONG INITIAL GROWTH OF PLUVIAL RICE NOT LINKED WITH A STRONG TENDENCY FOR TILLERING

B. LEDUC, (IV.021.0008)

Objective: To create a variety of pluvial rice with strong initial growth. This characteristic enables the variety to withstand possible periods of drought.

Approach: Choice of a restricted collection of 14 varieties of pluvial rice of very different types. Research on a varietal test for appraisal of the initial growth: staggered sowings in the field and observations on the morphology of the plant throughout the whole cycle; periodic sampling of seedlings. According to variety, division into classes for vigour, and sketching of a diagram; measurement of the dry matter produced at different stages of the cycle.

Results: Orientation of the choice of methods.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0165, MAINTENANCE OF A WORKING COLLECTION FOR INUNDATED RICE-FIELDS

B. LEDUC, (IV.021.0009)

Objective: To conserve the plant material aquired from surveys or introductions in order to utilize it as reference control in varietal experimental work and possibly as a sire.

Approach: Selection for conservation; study of the phases of the cycle, morphology of the variety, yield factors, reaction to accidents during growth, processing tests.

Results: In collection: 28 varieties.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0166, MAINTENANCE OF A WORKING COLLECTION FOR IRRIGATED RICE

B. LEDUC, (IV.021.0010)

Objective: To conserve the plant material obtained from surveys or introductions in order to utilize it as reference control in varietal experimental work and possibly as a sire.

Approach: Selection for conservation. Study of the phases of the cycle, morphology of the variety, yield factors, reaction to accidents during growth, processing tests.

Results: In collection: 13 varieties.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0167, VARIETAL EXPERIMENTAL WORK FOR PLUVIAL RICE

B. LEDUC, (IV.021.0011)

Objective: To replace the popularized varieties by better varieties for yield (utilization of nitrogenous manuring), resistance to piriculariosis, resistance to periods of drought, behaviour during processing.

Approach: Collection of introduced varieties and of lines tested at 4 experimental establishments. Multilocal varietal experiments re- grouped according to characteristic: short varieties, early varieties. In each case, study of the phases of the cycle, morphology of the variety, yield factors, reaction to accidents during growth, processing tests.

Results: Maintenance in popular use of varieties Iguape Cateto and Moroberekan. Possible replacement varieties to be confirmed: 63-83. Orientation of a part of the programme on the Brazilian varieties of 100 days type IAC 25/64. Elimination on account of piriculariosis of varietiesof IRAT type.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0168, VARIETAL EXPERIMENTAL WORK FOR IRRIGATED RICE

B. LEDUC, (IV.021.0012)

Objective: To replace some popularized varieties by better varieties for resistance to piriculariosis, the utilization of fertilization, the quality of the grain.

Approach: Varietal and multilocal experiments in irrigated rice- fields. Studies of the phases of the cycle, morphology of the variety, yield factors, reaction to accidents during growth, processing tests.

Results: Maintenance in popular use of varieties IR 5, IR 8, and IR20; tests in progress on replacement varieties CICA 4 from Colombia and JAYA.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0169, VARIETAL EXPERIMENTAL WORK FOR INUNDATED RICE

B. LEDUC, (IV.021.0013)

Objective: To replace the popularized varieties by better varieties for yield, resistance to piriculariosis, to being beaten down (or overturned), to drought at the outset of growth, to processing.

Approach: Behaviour plots. Multilocal varietal experiments (study of the phases of the cycle, morphology of the variety, yield factors, reaction to accidents during growth, processing tests).

Results: Maintenance in popular use of varieties of inundated rice: IM 16, OMA ROSSO and L 78.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0170, TECHNIQUES FOR PRODUCTION OF RICE SEEDS OF GOOD GERMINATIVE QUALITY

R. GUEGAN, (IV.021.0014)

Objective: The germinative capacity of rice seeds harvested in the Ivory Coast is variable: influence of the level of humidity harvesting (cleavage, rotting diseases) and of the conditions of cultivation in general.

Utility, therefore, of specifying the places and optimal seasons for production of seeds, as well as the techniques for cultivation, harvesting, drying, winnowing, storage.

All this with the object of obtaining regularly, homogeneous batches of seeds with high germinative capacity.

Approach: Analysis of different samples obtained from batches of seeds and from different crops. Experimental verification of the hypotheses formulated from these analyses.

Results: Importance of cleavage in the North of the Ivory Coast; good healthy quality of the harvests of the 2nd season of irrigated rice at Gagnoa.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0171, DEMONSTRATION OF SOME FACTORS OF RESISTANCE TO DROUGHT

F.N. REYNIERS, (IV.021.0015)

Objective: To measure on a few varieties of rice, some factors of resistance to drought known in respect of other plants.

Approach: Two types of factors of resistance to drought are measured: a) factors enabling (the plant) to retard the drying process: cuticular transpiration, the number of pores per unit of leaf surface, the regulation of the opening of the pores, the absorption

by the roots. b) factors enabling the plant to withstand the drought: latency, vigour, liberation of hydrolytic enzymes. Specific laboratory techniques for each characteristic will be used.

Results: The first measurments of cuticular transpiration have shown that it represents an important percentage of the total transpiration for rice, and that it presents important varietal variations.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0172, FLUCTUATION AND VARIABILITY OF THE FACTORS OF RESISTANCE TO DROUGHT IN THE GENUS ORYZA

F.N. REYNIERS, (IV.021.0016)

Objective: To determine for a single variety, the fluctuation of the factors of resistance to drought and if the fluctuations always vary in the same direction according to varieties. To determine in the species Oryza sativa and O. glaberrima, the amplitude of the variability of the factors of resistance to drought.

Approach: On a few varieties cultivated in pots in controlled conditions (air humidity, periods of drought at different stages of their cycle of development, etc.) the factors of resistance to drought are measured by laboratory techniques. On the basis of the results obtained the standard conditions for measurement will be determined.

Simple tests will be established which will enable screening for each factor of resistance to drought among a considerable collection of varieties of rice of different ecological origins.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0173, SPECIFIC EFFECTS OF THE FACTORS OF RESISTANCE TO DROUGHT IN RICE

F.N. REYNIERS, (IV.021.0017)

Objective: To classify the factors of resistance to drought according to their importance in the total resistance to drought.

Approach: Some varieties cultivated in pots will be subjected to periods of drought at different stages of development. In the course of cultivation, the maximum factors of resistance to drought will be estimated (factors enabling the plant to retard the drying process and factors enabling it to withstand the drought).

Correlations will be established between the varietal variations of the factors of resistance to drought and the varietal variations in yields as a function of the periods of drought.

This type of correlation will be established separately for the two types of factors of resistance.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0174, VARIETAL IMPROVEMENT OF THE PRODUCTIVITY OF MAIZE BY UTILIZING HYBRID FORMULAS

J.L. MARCHAND, (IV.021.0018)

Objective: To create hybrid formulas of good productivity and with a length of cycle adapted to the different zones of the Ivory Coast.

Approach: Parents: in general one parent from the tropical zone, one parent from a temperature zone. Formula: the most frequent is: population or composite - simple hybrid. Double or three-way hybrid formulas are also envisaged.

Results: In 1972, of 63 hybrid formulas under testing, 50 have exceeded 60 q/ha and 18 have exceeded 80 q/ha, the record (yield) being 100 q/ha (the local improved control yields 40 to 50 q/ha).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0175, VARIETAL COLLECTION OF MAIZE

J.L. MARCHAND, (IV.021.0019)

Objective: To assemble a considerable collection of varieties or maize, from the tropical zone especially, in order to conserve varied genotypes and there find stock for use in varietal improvement projects.

Approach: African material: surveys and study of the material assembled, before it is placed in the collection; foreign material: introduction of varieties or lines already improved.

Results: End of 1972: 106 varieties or lines from Tropical Africa (of which 80 from the Ivory Coast), 102 varieties or lines from Tropical America, 49 lines from temperature zones (South America and the U.S.A. especially).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0176, VARIETAL IMPROVEMENT OF THE PRODUCTIVITY OF MAIZE BY RECOURSE TO COMPOSITES

J.L. MARCHAND, (IV.021.0020)

Objectives: To obtain two composites of excellent agronomic value and presenting between them a strong heterosis.

Approach: Creation and improvement by recurrent selection of an African composite and of a foreign composite.

Results: A foreign composite of 14 varieties from Latin America is in the course of selection (cycle 2 in 1972-73) and will be completed, some African varieties have been assembled and observed. Four African composites with a small number of varieties have been created in 1972.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0177, MULTILOCAL TRIALS OF MAIZE

J.L. MARCHAND, (IV.021.0021)

Objective: Testing in wide-spread ecologcal zones of vareties and types obtained from different countries.

Approach: Varietal experiments repeated in several places: Tests of CYMMIT: numerous varieties (50), little repetition (2) distribution world-wide; Tests of PC 26: number of varieties reduced (12) distribution West Africa; IRAT: number of varieties reduced (12) distribution: IRAT Bureau of West Africa.

Results: Better knowledge of the local varieties. Introduction, utilization and possibly popularization of foreign varieties.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0178, VARIETAL COLLECTION OF YAMS

R. VANDEVENNE, (IV.021.0022)

Objective: Conservation and enrichment of the collection. The obtaining of true clones for the varieties adapted to mechanized cultivation.

Approach: Introduction of varieties from other countries. Clonal multiplication from tubers from a chosen plant. Study of the possibility of successful use of multiplication by stem cuttings.

Results: At present 87 varieties, 6 species cultivated in collection.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0179, STUDY OF THE PHYSIOLOGICAL AGE OF THE TUBERS OF YAMS AND OF THEIR BUDDING

R. VANDEVENNE, (IV.021.0023)

Objectives: To obtain regular system in the lifting of the tubers of a given variety.

Approach: Study of the relationship between the date of growth of the first tuber and the time of budding of this new tuber

formed by: gradated sowing and harvesting, cultivations out of season (de-seasoning of the tubers).

Observations: In the field beginning of tuberization of each plant after harvesting; beginning of budding of the tubers of each plant studied.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0180, VARIETAL COLLECTION MANIOC
R. VANDEVENNE, (IV.021.0024)

Objective: Conservation and enrichment of the collection.

Approach: Introduction of varieties of high yield from other countries.

Results: At present 85 varieties in collection.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0181, STUDY OF THE PECOCITY AND OF THE PRODUCTIVITY OF THE VARIETIES OF MANIOC
R. VANDEVENNE, (IV.021.0025)

Objective: To find varieties of Manioc having a high yield after 10 months of cultivation, to enable an integration of this crop into a rotation of annual crops.

Approach: Comparative experiments with varieties comprising: two dates for planting: 15 April - 15 August; three dates for harvesting: 10 - 15 - 20 months of cultivation.

Results: At present giving satisfactory results after 10 months of cultivation, varieties H 57, H 58, H 43, CB.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0182, VARIETAL EXPERIMENT WORK ON SOYA
C. DUMONT, (IV.021.0026)

Objective: To test the possibility of cultivating soya beans: as a single cycle only, in the zone having one rainy season; as one or two cycles in the zone having two rainy seasons.

Approach: Introduction of varieties from research stations: Bambey (Senegal), Madagascar, IITA Ibadan (Nigeria).

Results: Bertoua variety having brown seed with potentiality of 2 T/ha in second cycle or single cycle (cycle of 100 days). Improved Pelican variety having comparable potential and cycle, with yellow seed.

Results Sought: Earlier variety for the first cycle of cultivation.

Network project: See IV. 022.0007, IV. 023.0004, IV. 025.0005.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0183, CHEMICAL DESTRUCTION OF WEEDS ON A PLOT OF YAMS (DIOSCOREA)
G. RENAUT, (IV.021.0027)

Objective: To replace manual weeding by treatment with herbicides in a crop of yams.

Approach: Method of the Commission for Biological Studies (C.E.B.): Test of preparations, Behaviour experiment (to determine the minimum effective dosage), Test of selectivity (to determine the maximum dosage tolerated by the crop), Economic test (to examine the efficacy of the formulation in conditions bodering on the practical).

Results: The preparation Diuron (3 - 3.2 kg/ha) plus Paraquat (0.3 kg/ha) gives good results at the pre-emergent stage on yams. The experimental work is going on all the time, on account of the appearance each year of new preparations.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0184, MODIFICATIONS OF THE WEED FLORA DUE TO CHEMICAL HERBICIDE TREATMENTS
H. MERLIER, (IV.021.0028)

Objective: To determine the evolution of the composition of the weed flora as a sequel to the use of chemical herbicides as compared with that which follows hand weeding.

Approach: Plot of 0.6 ha in biennial rotation: rice and maize/-cotton, the two phases of the rotation being present on each half of the plot. In the course of the rotation, the same strips receive the chemical treatments relative to each crop. Records of the weed flora each year before the application of the treatments and at harvest time. Long-duration experiment (5 years minimum).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0185, WEEDING OF PLUVIAL RICE, COMBINING CULTIVATION TECHNIQUES AND CHEMICAL HERBICIDE TREATMENTS
G. RENAUT, (IV.021.0029)

Objective: To obtain, by the combinaton of cultivation techniques and chemical treatments, a better destruction of weeds than that obtained by these techniques used alone.

Approach: Comparative experiment, as Fisher blocks, for study of the following: quantities of seed, density of sowing, method of sowing, manual weeding, motorized weeding, chemical weed destruction, directed or not.

Results: The results obtained are not yet conclusive on account of the unfavourable climatic conditions to which all the experiments have been subjected.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0186, STUDY OF THE DORMANCY OF WEED SEEDS
H. MERLIER, (IV.021.0030)

Objective: To find the most effective methods for stimulating the seeds from dormancy.

Approach: Comparison between the following treatments: thermal: soaking in baths at different temperatures, alternation of hot and cold; chemical: by soaking in chemical solution; mechanical: scarification.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0187, DETERMINATION OF WEEDS AT THE SEEDLING AND YOUNG PLANT STAGES
H. MERLIER, (IV.021.0031)

Objective: To enable a precise inspection of the efficacy of the means of control used against weeds on plantations by the possibility of determination of these weeds as soon as they start and at the first stages of development of the leaves, and before their elimination by the treatments.

Approach: Cultivation in pots. Drawings and photographs. Establishment of a practical key to recognition.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0188, STUDY OF THE BIOLOGICAL CYCLES OF WEEDS
H. MERLIER, (IV.021.0032)

Objective: To determine the biological cycle of weeds in the natural environment and the variations brought by interspecific competition (other weeds and cultivated plants) and the conditions of cultivation.

Approach: Study of the complete cycle in natural surroundings and in pots. Independence or interdependence of the different phases of the cycle. Variations of the cycle of the species in competition: with the other weeds, with the rice, with the other weeds plus the rice. Variations with intensity of working of the soil.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0189, STUDY THE INFLUENCE OF THE DROUGHT FACTOR ON THE RESISTANCE OF RICE TO PIRICULARIOSIS

J.M. BIDAUX, (IV.021.0033)

Objective: It has been noticed on several occasions that piriculoriosis was more important when the rice was suffering from drought. To study the action of drought on the expression of horizontal resistance of rice.

Approach: Plantations of rice are cultivated under different conditions of nutrition in water: irrigated, pluvial to capacity in the field, pluvial to capacity in the field and an antitranspirant, pluvial with high pF value, pluvial with high pF value and antitranspiran. The behaviour of the epidemic after artificial inoculation is compared.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0190, CHEMICAL CONTROL MEASURES AGAINST PIRICULARIA ORYZAE

J.M. BIDAUX, (IV.021.0034)

Objective: To find efficacious preventive or curative preparations that are of economic value and suitable for use in experimental work, on seed multiplication farms or on rice-fields that are already very productive.

Approach: Several stages in laboratory testing and micro-assays: in vitro sensitivity test on P. oryzae (growth of mycelium and germination of the spores); test efficacy as a treatment for the seeds and for the soil; test of efficacy as a treatment for the leaves, with artificial inoculation with the parasite; test of efficacy as a treatment for the panicle with artificial inoculation of the necks; test for residual effect of the preparations; residues of active material in the plant.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0191, STUDY OF THE GENETIC STRUCTURES OF HORIZONTAL RESISTANCE OF RICE TO PIRICULARIA ORYZAE

J.M. BIDAUX, (IV.021.0035)

Objective: It is expected that the horizontal resistance of rice is governed by a polygenic genetic system, in which epistesics and interactions play an important role. The object here is to gather more exact information on the functioning of these genetic structures in order to orient the selection of resistant varieties in the most profitable ways.

Approach: Choice of 8 to 10 parents (Oryza sativa indica varieties) which have aready undergone severe pressure - challenge from the parasite in the course of selection. The choice is based not only on resistance characters but at the same time morphological or physiological characters. Diallele test with 8 parents, with all possible crossings. Analysis of the results on F1 and F2 generations and self-fertilizations.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0192, RESEARCH IN CULTIVATED RICE FOR SIRES HAVING HORIZONTAL RESISTANCE TO PIRICULARIOSIS

J.M. BIDAUX, (IV.021.0036)

Objective: The reaction of varieties of rice to piriculariosis is very variable. A search is made for varieties resistant to all strains of the parasite. These varieties would be used as stock in a selection programme.

Approach: A vast collection has been assembled of varieties or lines originating from West Africa, from selections of the Ivory Coast IRAT, from international IBN tests, from the traditional crops of peasant farmers. These varieties (about 3000) will be subjected to successive screenings, with artificial inoculations with Piricularia, in order to reveal and recognize the different expressions of horizontal resistance, and later to utilize as sires the varieties possessing a high level of horizontal resistance. For each type of expression of horizontal resistance the maximal differences which exist between the susceptible and the resistant varieties are to be characterized. A study will also be made of the correlations which may appear between the expressions of horizontal resistance obtained in the field and in different experimental conditions (hot-house, cultivation in earthenware pans, etc.)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0193, ANALYSIS OF THE RELATIVE INCIDENCE OF STRAINS OF PIRICULARIA ORYZAE IN RICE-FIELDS

J.M. BIDAUX, (IV.021.0037)

Objective: The population of Piricularia oryzae comprises numerous strains whose relative incidence depends upon the host and on the environment. To analyze the relative incidence of the strains in order to recognize the genes that are most sensitive to the differential forces of selection, the genes that are very easily exploited in selection.

Approach: At the beginning and at the end of an epidemic, samples will be taken from patches (spots) from which 200 to 300 single-spore strains will be isolated. The spectrum of virulence of these will be tested with the aid of a scale of differential varieties inoculated artificially.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0194, CREATION OF A DIFFERENTIAL SCALE OF STRAINS OF PIRICULARIA ORYZAE

J.M. BIDAUX, (IV.021.0038)

Objective: The obtaining of a differential scale of strains of Piricularia oryzae to enable rapid analysis of the genetic structures which, in rice, govern vertical resistance.

Approach: Two types of approach: As the isolations and virulence tests of the parasite proceed, it wll be possible to create the scale step by step - 16 strains are necessary. The spectrum of virulence of these strains being very precise, it will be necessary to have recourse to artificial mutations to modify the spectrum of adjacent isolates in order to create this theoretical scale.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0195, EXPERIMENT ON PREPARATION OF THE SOIL BEFORE CROPPING

KAIMS, (IV.021.0039)

Objective: To determine whether cropping without tillage is possible. If it is, in what types of soils and under what conditions?

Approach: Experiments in open field comparing the treatments: non- working of the soil, minimum working and conventional working with the plough.

Results: Experiments not comprising non-working have shown that in numerous cases ploughing to 25 cm in depth was favourable.

National network project: See IV. 025.001.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0196, ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR - BY CEREALS (RICE - MAIZE)
P.F. CHABALIER, (IV.021.0040)

Measurement of the true coefficient of utilization of fertilizer-N by the plant (pluvial and irrigated cultivation). Measurement of the coefficient of transformation of the fertilizer-nitrogen into grain proteins (pluvial and irrigated cultivation). Study the influence of repeated burials of straw on these coefficients (pluvial cultivation). Curves of response to nitrogen in the presence or absence of burial of straw. Utilization of nitrogenous fertilizer labelled with 15N.

National network project: See IV. 022.0003.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0197, EVOLUTION OF NITROGEN IN CULTIVATED SOILS
P.F. CHABALIER, (IV.021.0041)

Study of the participation of the fertilizer-nitrogen in the pool of mineral nitrogen (ferralytic soil and hydromorphic soil). Study of the incorporation of the fertilizer-nitrogen in the nitrogen of the soil (ferralytic soil and hydromorphic soil). Study of the influence of repeated burials of straw on these phenomena (ferralytic soil). Application of 3 to 5 doses of nitrogen in the presence or absence of buried straw, utilization of labelled nitrogen 15N. The experiment carried out without 15N shows that the application of straw does not influence the yield but does appreciably modify the dynamics of the nitrogen (ferralytic soil).

National network project: See IV. 022.004.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0198, STUDY OF INOCULATIONS OF RHIZOBIUM ON SOYA
P.F. CHABALIER, (IV.021.0042)

To choose a highly effective strain of Rhizobium and to determine the fertilization that is economically the most profitable. Experiments and tests with inoculation. Factorial experiments of inoculation times applications of nitrogen. At present the Rhizobium being used is that under the trade mark Nitragin which gives quite good nodulation. This nodulation is influenced by the pH of the soil and by the applications of fertilizer-H.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0199, EROSION OF TILLED LAND
J. GIGOU, (IV.021.0043)

Comparison is made in a small plot on the erosion of soils that have been worked in the following ways: no tillage, harrowing, ploughing, ploughing and harrowing. The deep working lessens rivulet formation and erosion.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0200, CORRECTION OF MINERAL DEFICIENCIES OF THE PRINCIPAL SOILS OF THE IVORY COAST
B. LEBUANEC, (IV.021.0044)

Objective: The principal mineral deficiencies having been catalogued. It remains to determine rates of application of elements necessary to correct them.

Approach: Method of curve of response to one element, all the others being applied at a sufficient rate to ensure good mineral nutrition for the plant.

Results: The responses to phosphorus and nitrogen are very clear- cut. For phosphorus, they depend essentially on the type of soil. For nitrogen, they depend on the soil but especially on the plant cultivated (difference between species and varieties).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0201, EVOLUTION OF SOILS UNDER CULTIVATION
B. LEBUANEC, (IV.021.0045)

Objective: To study the evolution of the fertility potential of soils subjected to mechanized agriculture (team or motorized) after clearing of savannah or forest.

Approach: Observation of the yields and measurement of the principal agronomic variables of the soils in the course of time on a certain number of plots, either in large-scale cropping or in classical experiments with small plots.

Results: On one of the stations, at Bouake, at the end of ten years of cropping, the productivity potential of the soils has been conserved (rotation of 3 to 5 years comprising 1 or 2 years of forage crops).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0202, DETERMINATION OF MINERAL DEFICIENCIES IN THE PRINCIPAL SOILS OF THE IVORY COAST
B. LEBUANEC, (IV.021.0046)

Objective: To determine the mineral deficiencies existing in the soils of the Ivory Coast after clearing (dry, irrigated and inundated cropping). To study the dynamics of the appearance of deficiencies in time, in cases of unbalanced fertilization.

Approach: Withdrawal experiments in the field, in continuous cropping, with total quantities taken out at harvesting (elements studied: N, P, K, S, Ca, Mg).

Results: In dry and inundated cropping, there is general phosphate deficiency. Deficiency in nitrogen, existing from the outset in savannah, appears more or less rapidly in forest (2 to 5 cycles). Deficiency in potassium, non-existent at the start, appears at the end of 4 to 5 cycles. In low-lying irrigated land, there is no deficiency at the start; the deficiency in nitrogen appears rapidly and is followed by that in potassium (exception: deficiency in P in the West).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0203, ACIDIFICATION DUE TO THE INTENSIVE USE OF FERTILIZERS
B. LEBUANEC, (IV.021.0047)

To study the intensity of the phenomena of acidification as a function of the nature and the rate of application of fertilizers. Block experiments in open field. Study of the plant production and regular measurement of the pH value.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

IVORY COAST

4.0204, CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE

G. RENAUT, (IV.021.0048)

Objective: To replace manual weeding by chemical treatments on pluvial rice.

Approach: Method of the Commission for Biological Studies (C.B.S.). Testing of preparations. Behaviour experiment (to determine the minimal effective dose. Selectivity test (to determine the maximal dose tolerated by the crop). Economic test (to inspect the efficacy of preparations in conditions bordering on practice).

Results: The mixture propanil (2.5 - 2.8 kg/ha plus 0.75 kg/ha of (24D plus MCPA) or of 2, 4, 5 TP, applied after the rice and the weeds have come up, gives acceptable results. The experimental work is going on all the time on account of the appearance each year of new preparations.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0205, CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE

G. RENAUT, (IV.021.0049)

Objective: To replace manual weeding by chemical treatments.

Approach: Method of the Commission for Biological Studies (C.B.S.): Testing of preparations. Behaviour experiment (to determine minimal effective dose). Selectivity test (to determine maximal dose tolerated by the crop). Economic experiment (to inspect the efficacy of formulations in conditions bordering on practice).

Results: The mixture propanil (2.1 - 2.5 kg/ha) associated with 2, 4, 5-TP (0.5 - 0.75 kg/ha) gives satisfactory results, as an application in the 15 to 20 days after pricking-out. Experimental work always in progress on account of the appearance, each year, of new preparations.

National network project: See IV. 021.0004, IV. 023.0003, IV. 024.0004.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0206, INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS

H. MERLIER, (IV.021.0050)

Objective: (1) To determine the composition of the weed flora as a function of the age of rice-fields. (2) To verify whether differences in composition of the flora exist according to the ecological zones of the Ivory Coast which would justify specific approaches in the matter of control by chemical or cultural means.

Approach: Botanical survey in the different ecological zones at different periods of the year.

Result: The study is to start in 1973 and should be finished in 1974.

National network project: See IV. 023.0002, IV. 022-0005, IV. 025.0003, IV. 024.0003.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

STATION IRAT DE FERKESSEDOUGOU

B.P. 121, Ferkessedougou

4.0207, EXPERIMENT ON PREPARATION OF THE SOIL BEFORE CROPPING

KAIMS, (IV.025.0001)

National network project: See IV. 021.0039. (4.0195)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0208, CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE

G. RENAUT, (IV.025.0002)

National network project: See IV. 021.0048. (4.0204)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0209, INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS

H. MERLIER, (IV.025.0003)

National network project: See IV.021.0050. (4.0206)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0210, CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE

G. RENAUT, (IV.025.0004)

National network project: See IV.021.0049. (4.0205)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0211, VARIETAL EXPERIMENT WORK ON SOYA

G. DUMONT, (IV.025.0005)

Network project: See IV.021.0026. (4.0182)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

STATION IRAT DE GAGNOA

B.P. 602, Gagnoa

4.0212, SPECIFIC ROLE OF ORGANIC MATTER IN TROPICAL SOILS

P.F. CHABALIER, (IV.022.0001)

Objective: To understand the mechanisms of action of organic matter on soils and yields.

Approach: Treatments with considerable mineral fertilization: P - K - S - Ca - Mg. Increasing rates of application of nitrogen with or without applications of pre-moistened organic matter. Factorial experiment 2 x 6 with 8 repetitions.

Results: After clearing, the application or organic matter is clearly seen. Effect is less clear-cut the following year on the yields of grain crops, but still clear-cut on the straw (s). Depressant effect for the high rates of application of nitrogen.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0213, BALANCE OF MINERAL ELEMENTS UNDER CULTIVATION - MAINTENANCE FERTILIZATION

P.F. CHABALIER, (IV.022.0002)

Network Project: See IV. 021.0002. (4.0158)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0214, ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR BY CEREALS (RICE-MAIZE)
P.F. CHABALIER, (IV.022.0003)
International network project: See IV. 021.0040. (4.0196)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0215, EVOLUTION OF NITROGEN IN CULTIVATED SOILS
P.F. CHABALIER, (IV.022.0004)
International network project: See IV.021.0041. (4.0197)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0216, INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS
H. MERLIER, (IV.022.0005)
National network project: See IV. 021.0050. (4.0206)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0217, CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE
G. RENAUT, (IV.022.0006)
National network ppoject: See IV. 021.0049. (4.0205)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0218, VARIETAL EXPERIMENT WORK ON SOYA
G. DUMONT, (IV.022.0007)
Network project: See IV. 021.0026. (4.0182)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

STATION IRAT DE MAN

B.P. 440, Man

4.0219, CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE
G. RENAUT, (IV.023.0001)
National network project: See IV. 021.0048. (4.0204)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0220, INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS
H. MERLIER, (IV.023.0002)
National network project: See IV. 021.0050. (4.0206)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0221, CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE
G. RENAUT, (IV.023.0003)
National network project: See IV. 021.0049. (4.0205)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

4.0222, VARIETAL EXPERIMENT WORK ON SOYA
G. DUMONT, (IV.023.0004)
Network project: See IV.021.0026. (4.0182)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bouake, I.C.

STATION IRCA DE BIMBRESSO

B.P. 1536, Abidjan

4.0223, STUDY THE LUTOIDS OF THE LATEX OF THE RUBBER TREE - HEVEA
L. PRIMOT, (IV.091.0001)

Objective: 1) Study the lutoid membrane: fundamental characteristics, function, reactions provoked by different physico-chemical factors. 2) Study the modifications and the evolution of the lutoids by tapping. 3) Comparative study of the lutoids of different clones of rubber.

Approach: Utilization of radioactive markers to determine the characteristics of the membranous permeability of the lutoids.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0224, REGENERATION OF THE LATEX OF THE RUBBER TREE AFTER TAPPING
L. PRIMOT, (IV.091.0002)

Objectives: Research on organic and mineral criteria of fatigue of the tree during tapping. Correction of fatigue of the tree. Study of other phenomena intervening in the regeneration of the latex after tapping.

Approach: Study of the physiological fatigue of the trees during tapping by the intervention of the glucides of the latex and by study of the translocation of these glucides.

Results: It appears that the content of the latex in glucides may be a very important limiting factor in the regeneration of the rubber tree.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0225, TAPPING OF THE RUBBER TREE - STUDY THE FLOW OF THE LATEX
L. PRIMOT, (IV.091.0003)

Objective: Study the factors which intervene in the flow of the latex: rhythm of pulse flow, length of the notch, influence of the climate, influence of regulation of moisture, of solar radiations, etc.

Approach: Observation and experimental work on the factors brought into play in the flow of the latex. Utilization of bioclimatological techniques.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0226, TAPPING OF THE RUBBER TREE - STUDY OF NEW PREPARATIONS FOR STIMULATION OF PRODUCTION
L. PRIMOT, (IV.091.0004)

Objective: To study the utilization of new stimulant preparations appearing on the market, with a view to testing their effect and recommending them for large-scale applications.

Approach: Experimental work on the new stimulants: rates of application and conditions for use.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

IVORY COAST

4.0227, IMPROVEMENT OF THE RUBBER TREE - VEGETATIVE IMPROVEMENT - STUDY OF THE PLANTING MATERIAL

J.C. COMBE, (IV.091.0005)

Objective: Pursuit of the improvement of the rubber tree by the study of the planting material on the spot and by the introduction of interesting selections originating from the Far East or from other rubber-growing countries.

Approach: Study of the characteristics of clones: growth, precocity, production, resistance to wind in the established fields for clone comparison following the normal methods which enable statistical analysis of observations.

Results: The fields for comparison of clones already established have enabled the recommendation of certain highly productive clones that are particularly well adapted to the local conditions.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0228, IMPROVEMENT OF HEVEA BRASILIENSIS - RESEARCH ON CRITERIA FOR SELECTION

J.C. COMBE, (IV.091.0006)

Objective: The obtaining of vegetative criteria to be used in the tasks of improvement (architecture of the trees, character of the wood in connection with wind-resistance, etc.).

Approach: Anatomical structure of the wood of the rubber tree to determine the specific factors of its resistance to wind. Anatomical study of the latex tubes in the young plant.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0229, VEGETATIVE IMPROVEMENT OF HEVEA - REDUCTION OF THE INTERCLONAL VARIABILITY

J.C. COMBE, (IV.091.0007)

Objective: Research for a greater homogeneity in growth; cultivation and production of clones for large-scale propagation.

Approach: The experimental work in progress is aimed at establishing criteria for choice at three levels: 1) Selection of the stock (for grafting) in the nursery, based on the rhythm of growth, 2) Research for the scion having the greatest aptitude for organogenesis of vegetative axes with early ramifications, 3) Research on criteria for elimination among grafted saplings.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0230, PREPARATION OF PLANTING MATERIAL FOR HEVEA

P. GENER, (IV.091.0008)

Objective: Determination of the best planting techniques adapted to climate and to the terrain. Study of the methods for preparation of the corresponding plant material (seeds, germinated seeds, cuttings, stumps).

Approach: Setting up comparative experiments on techniques. Definition of the costs of execution, of delays in obtaining plantable material. Influence on growth, entry into production and on production. Study the profitability of the different methods studied.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0231, IMPROVEMENT OF HEVEA BRASILIENSIS - EARLY FLOWERING

D. NICOLAS, (IV.091.0009)

Objective: Research on induction of early flowering in order to shorten the delays in obtaining successive generations.

Approach: Utilization of physiological techniques and of chemical substances.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0232, IMPROVEMENT OF HEVEA BRASILIENSIS - CONTROLLED CROSSINGS OF OLD EXISTING ORIGINS

D. NICOLAS, (IV.091.0010)

Objective: Utilization of ancient origins chosen as a function of new criteria for the obtaining of new clones.

Approach: Starting from new criteria for selection, research for mother-trees among those of ancient origin. Controlled crossings of these mother-trees. Application of the criteria for selection to the populations obtained. Observation of these populations. Application of techniques for early flowering to the interesting individuals.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0233, IMPROVEMENT OF HEVEA - THE OBTAINING OF CROSSINGS STARTING FROM THE NEW ORIGINS

D. NICOLAS, (IV.091.0011)

Objective: The obtaining of highly productive crossings by introduction of new (material of) Amazonian origin.

Approach: Mission for observation and collection of material of new origins in the Amazon country. Application of selection criteria to these origins. Crossings of those retained. Selection in the populations so made, as a function of the selection criteria for obtaining, either mother-trees of clones, or families for use without grafting.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0234, IMPROVEMENT OF HEVEA BRASILIENSIS - THE OBTAINING OF POLYPLOIDS

D. NICOLAS, (IV.091.0012)

Objective: The obtaining of tetraploids (2N equals 72) of high productivity.

Approach: Utilization of mutagenic substances and techniques.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0235, DETERMINATION OF THE OPTIMUM PLANTATION DENSITIES AND ARRANGEMENTS FOR RUBBER TREES

A. CORNIER, (IV.091.0013)

Objectives: Study the influence of plantation density and arrangement on growth and production.

Approach: Experiment planted in 1959. Surface area 23.8 hectares. Here a study is being made of 55 arrangements by the combination of 5 different distances between rows and 11 different spacings of trees in the row; the planting densities vary with every 30 trees, from 500 trees/ha up to 800 trees/ha.

Results: The low densities at time of planting enable early production and lower expenses for tapping (elements to be considered in financial calculations of profitability). But the higher initial densities constitute an assurance for having the trees prepared for tapping and consequently for a sufficient number of trees fit for tapping per Ha to redeem the fixed expenses of investment, despite the losses arising from diseases of the roots in a forestry zone.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0236, METHODS OF PREPARING THE GROUND FOR PLANTATION OF RUBBER TREES

A. CORNIER, (IV.091.0014)

Objective: To determine the best methods for preparation of the ground, for felling forest for replacement by plantations.

Approach: Comparison of mechanical preparation and manual preparation of an extension on forest. Comparison of the manual and mechanical methods of digging planting-holes. Planted in 1971 in the south-west of the Ivory Coast. Study of the influence of the mode of preparation on the characteristics of the soil.

Results: On a forest site on tertiary sands, the mechanical preparation seems to give better results than manual preparation for the felling as well as for the digging of holes. This is noticeable by the growth measurements and the attacks of diseases of the roots.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0237, PREPARATION OF PLANT MATERIAL FROM HEVEA FOR PROPAGATION - UTILIZATION OF GROWTH SUBSTANCES

P. GENER, (IV.091.0015)

Objective: Research for growth substances (and their toleration by plants) favouring recovery and plant development.

Approach: At first, work on the stimulation of root growth and causing the buds to burst by steeping or powdering the base of the cuttings before planting them. Afterwards, stimulation of growth by application of stimulant preparations on the buds that have burst.

Results: Positive results have been obtained with indolbutyric acid and with 2 (Beta-chloro-Beta-cyanoethyl) 6-chlorotoluene (PR 38).

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0238, WEED DESTRUCTION BY HERBICIDES IN HEVEA PLANTATIONS

R. ROUXEL, (IV.091.0016)

Objective: Perfecting the techniques elaborated by the IRCA on the upkeep of the rows and of the intervals between rows in plantations by attention to the level of weed growth and the use of herbicides; in the case of the tertiary sands and in that of the soils of the south- west of the Ivory Coast.

Approach: Treatments starting from a threshold level of weediness. Inspection of the residual effects of the treatment. Comparative economic studies of the treatments taking into account their cost price, difficulty of manipulation, efficacy and the residual activity of the preparation.

Results: After having defined the maximum level of weediness tolerable to the rubber plant according to its age, the IRCA has defined a series of regulated treatments during the entire immature period, allowing the tree its best growth at a minimum cost of treatment while allowing the soil to conserve its fertility.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0239, MINERAL NUTRITION AND FERTILIZATION OF YOUNG PLANTATIONS OF RUBBER TREES

A. CORNIER, (IV.091.0017)

Objective: On soils of tertiary sands, possible correction of deficiencies observed in the contents in mineral elements of the leaves so that the tree may come into production as quickly as possible and in the best condition.

Approach: Research on deficiencies of the plantation soil by the test of cultivation of plants (Pueraria) in pots. Analysis of leaves - foliar diagnosis. Attempt to correct deficiencies by applications of fertilizer before making use of the trees.

Results: Good results have been obtained on the soils of the Dabou savannah and on replantation soils. Improvements are necessary for determining the exact rates for application of fertilizer and to avoid wastage of fertilizers.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0240, MINERAL NUTRITION AND FERTILIZATION OF RUBBER TREES ON PLANTATIONS IN PRODUCTION

A. CORNIER, (IV.091.0018)

Objective: On soils of tertiary sands, to maintain the mineral nutrition of the trees at a satisfactory level to obtain the maximum production.

Approach: Periodic investigations of the content in mineral elements of the leaves by foliar diagnosis. Inspection of the growth of the tree by regular recording of measurements. Investigation of production: measurement in litres, and dry yield of rubber. Application of fertilizer as a function of the three preceding investigations.

Results: Positive results have been obtained in the savannah of Dabou in particular. An experiment set up in 1961 on a 1958 plantation has yielded interesting data for the economic study of fertilization.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0241, MINERAL NUTRITION OF HEVEA - IMPROVEMENT OF THE TECHNIQUES FOR INSPECTION OF MINERAL NUTRITION

A. CORNIER, (IV.091.0019)

Objective: To improve the techniques for foliar diagnosis, withdrawal tests by cultivation in pots, analysis of soils. To improve the relations between these techniques, their results and production.

Approach: To make foliar diagnosis more specific for the age of the trees, for the position of the leaf, for the date of sampling in the vegetative cycle. To co-ordinate the results of the withdrawal tests on Pueraria grown in pots with the results of the soil analyses.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

IVORY COAST

4.0242, EARLINESS OF TAPPING OF RUBBER TREES

A. CORNIER, (IV.091.0020)

Objective: To increase the productiveness of the plantation by practicing an early starting of tapping.

Approach: To make a comparison of different treatments involving modifications of the normal practice with regard to the start of tapping (circumference of the trees, number of trees fit for tapping per hectare). Measurement of growth and of production. Economic study embracing several years.

Results: Experiment set up at end of 1969. Data still insufficient for conclusions of any value to be drawn from them.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0243, STIMULATION OF RUBBER TREES FOR EARLY PRODUCTION

A. CORNIER, (IV.091.0021)

OBJECTIVE: To increase the profitability of the plantation by practising stimulation to obtain an increase in production from the first few years of the concern.

APPROACH: Application of stimulants at different rates and at different intervals, very strict supervision of growth in order not to hinder the development of the tree and compromise its production potential in adult age. Also very strict supervision of the state of health of the tapping panel in order not to comprimise use being made of the second and third panels.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0244, TAPPING OF RUBBER TREES - RESEARCH ON PRODUCTION - GROWTH EQUILIBRIUM

A. CORNIER, (IV.091.0022)

OBJECTIVE: In the exploitation of the adult tree, with the immediate and foreseeable economic returns in mind, to study the conditions of production - growth equilibrium for increasing the profitability of the plantation.

APPROACH: Combination of systems of exploitation integrating the different intensities of exploitation (length of the notch, frequency of tapping, stimulation, arrest of tapping) with a regular growth of the tree, increasing its production capacity and its economic yield.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0245, TAPPING OF RUBBER TREES - RESEARCH ON THE EQUILIBRIUM BETWEEN YIELD BY THE HECTARE AND YIELD BY WORKER

A. CORNIER, (IV.091.0023)

OBJECTIVE: Study the combinations likely to give the best yield by the hectare, while still keeping the cost of the concern (especially in expediture on labour) at a minimum level.

APPROACH: Attempt to reduce the intensity of tapping compensated by stimulation. Experiment on cumulative tapping, reducing the intervention of labour by the increase in the tasks of workers. Use of more efficient stimulant preparations, enabling reduction of the number of tapping operations.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0246, INFLUENCE OF THE PERIOD OF ARREST OF TAPPING RUBBER TREES UPON GROWTH, PRODUCTION AND TAPPING CUT DISEASES

A. CORNIER, (IV.091.0024)

OBJECTIVE: To determine the periods of arrest of tapping that are the most favourable for growth, for production and for reduction of the incidence of tapping cut diseases according to the climatic conditions (recorded rainfall).

APPROACH: Experimental work in the field with intervention of different periods of arrest of tapping.

RESULTS: Previous experimental work has shown that the growth of the majority of the clones widely distributed in the Ivory Coast was better and that the incidence of diseases of tapping cut was reduced when the annual arrest of tapping took place during the rainy season.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0247, CUMULATIVE TAPPING OF RUBBER TREES

A. CORNIER, (IV.091.0025)

OBJECTIVE: To study the method of collection in plastic bags to replace the collection of the latex in cups, with a view to the reduction of the running cost, and the toughness and flexibility of this material.

APPROACH: Research to ascertain the organization of the work to obtain the best yield in kilograms/worker/day, taking into account the qualities of the rubber obtained after factory processing.

RESULTS: It appears that the tapping into polythene bags entails an appreciable economy in the harvesting of rubber. However, a higher cost of processing than with the latex must be noted and also a slight depreciation of the product in relation to the rubber from latex.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0248, TAPPING OF RUBBER TREES - ANTI-RAIN BANDS

A. CORNIER, (IV.091.0026)

OBJECTIVE: To reduce to the minimum the losses of production due to rivulets of water during the rains before and during tapping.

APPROACH: Study of the best form to be given for a maximum efficacy for deflection of the rain water and the water streaming down the trunks. Reseach on the most economical material: the use of these bands depends upon its price, therefore upon its composition and the duration of its efficiency.

RESULTS: Several materials have been studied and adequate forms have been found, but their price is still too high.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0249, DISEASES OF THE ROOTS OF RUBBER TREES - CONTROL MEASURES AGAINST FOMES LIGNOSUS

R. ROUXEL, (IV.091.0027)

OBJECTIVE: In the tertiary sands of the lower Ivory Coast, to reduce the losses due to Fomes lignosus during the first few years of plantation.

APPROACH: Study of the influence of the cover plants upon the development of the fungus. Study of preparations having a curative action. Study of other influences such as method of clearing. Density of plantation, humidity of the soil, and of the climate. Method of biological control.

RESULTS: Already utilized as a cover plant, Tithonia has a certain effect in controlling the incidence of Fomes lignosus and considerably reduces the losses by cryptogamic diseases of roots. For the direct method of control, different fungicidal preparations are being compared for application on the roots and the tap-root. It should also be pointed out that with mechanical clearing there would be fewer losses than with manual clearing, on soils composed of tertiary sands.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0250, BIOLOGICAL CONTROL OF DISEASES OF THE ROOTS

R. ROUXEL, (IV.091.0028)

OBJECTIVE: Biological control particularly of the fungi Fomes, Armillaria and Ganoderma spp. To replace the artificial control methods which are expensive, by natural methods which are more efficacious and less onerous.

APPROACH: 1. Deepening the knowledge acquired on the subject of biological control (influence of soil cover, role and mode of action of sulphur, influence the mode of preparation of the planting material and of planting). 2. Study the host - parasite interactions (routes and mechanisms of infection, physiological and biochemical mechanisms of resistance to infection). 3. Study the relations between the pathogenic agents and their environment. Ecology and biological environment (antagonistic saprophytes).

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0251, DISEASES OF LEAVES OF HEVEA IN NURSERY

R. ROUXEL, (IV.091.0029)

OBJECTIVE: Control of the diseases of leaves in nursery (Helminthosporium and Gloeosporium).

APPROACH: Tests of commercial preparations. Statistical arrangement enabling comparisons of efficacy and of persistence.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0252, CONTROL OF DISEASES OF THE TAPPING PANEL OF HEVEA

R. ROUXEL, (IV.091.0030)

OBJECTIVE: To obtain a practical and economical method for control of diseases of the tapping panel of rubber trees, caused by Phytophthora and secondary parasites.

APPROACH: Experimental work in the field on the use of active fungicides that are not toxic for the bark; research on combinations for use of fungicides and of preparations for stimulating the production of the tree; research on the utilization of agronomic means (density and arrangement in plantation, arrest of tapping in appropriate periods, etc.).

RESULTS: Demonstration of the efficacy of different fungicides, of the advantage of plantation arrangements (distance between trees in the plantation row) and of the arrest of tapping in the rainy season.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0253, EVALUATION OF THE PROPERTIES OF THE RUBBERS OF THE IVORY COAST - SPECIFICATION OF RUBBER

G. LOYEN, (IV.091.0031)

OBJECTIVE: Determination of the chemical and technological properties of the rubbers produced in the Ivory Coast in view of their sale on technical specification in accordance with the normal international practice.

APPROACH: Chemical analyses of the substances and elements figuring in the normal international specifications. Determination of the technological properties.

RESULTS: The inspections carried out have provided a sound knowledge of the properties of the rubber productions of the Ivory Coast, and have enabled the establishment of a practical and effective method for sampling and for determinations.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0254, TECHNOLOGY OF NATURAL RUBBER - RUBBER FROM CUMULATIVE TAPPING

G. LOYEN, (IV.091.0032)

OBJECTIVE: Study rubbers yielded by cumulative tapping with a view to their improvement and their specification.

APPROACH: Research on procedures which would allow an increase in the plasticity retention index (PRI) of certain clones. For other clones, research on techniques or on preparations to improve the colour of the rubber.

RESULTS: Demonstration of differences in PRI and in colour according to the clonal origin of the rubber. The obtaining of an improvement by the use of chemical preparations and of factory processing techniques.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0255, TECHNOLOGY OF NATURAL RUBBER - RUBBERS STRETCHED BY OIL

G. LOYEN, (IV.091.0033)

OBJECTIVE: To increase the facility of working up the rubber and the value of the product by adding by-products of oil-refinery.

APPROACH: Extension by oil at the latex stage: Study of the types of oil capable of being incorporated; study of the quantities to be incorporated; statistical analyses of the results of the technological experiments; research on a harmonious comprise between price and characteristics.

RESULTS: Results of interest to the manufacturer have been obtained: lowering of the Mooney viscosity and of the expenditure of energy.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0256, TECHNOLOGY OF NATURAL RUBBER MASTER-MIXTURES BASED ON LOCAL PRODUCTS

G. LOYEN, (IV.091.0034)

OBJECTIVE: Incorporation in the latex products or by-products of local origin, enabling an increase in value of the rubber and an improvement in the technological qualities of the product to be exported or for use in the producing countries.

APPROACH: Introduction of charges of minerals such as clay. Selection beforehand of the levels of clay to be incorporated in the rubber. Introduction of organic charges such as caseins, proteins obtained from the waste materials of local industry (canning factories, etc.).

RESULTS: Interesting results have been obtained with proteins extracted from the waste material from tunny-fish and sole.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

4.0257, TECHNOLOGY OF NATURAL RUBBER - PROCESSING OF THE RUBBER IN A GRANULAR FORM
B. DRON, (IV.091.0035)

OBJECTIVE: Research on methods for processing rubber in a granular form - a practical, economic product favourable to the technological properties for the different qualities supplied to the factory: latex, dregs from the cups, rubber from cumulative tapping.

APPROACH: Experiments in the factory on the equipment for processing (crisping ("crepeing"), cleaning of rubber, granulation, drying, packing).

RESULTS: Establishment of an effective and economical apparatus for granulation (crushers with a set of hammers) and of conditions for drying the granulated rubber.

SUPPORTED BY Inst. de Rech. Caoutchouc Afrique - France

STATION IRCT DE BOUAKE

B.P. 604, Bouake

4.0258, VARIETAL EXPERIMENTS WITH IRRIGATED COTTON
S. GOEBEL, (IV.061.0001)

OBJECTIVE: Varietal tests (combined with agronomic factors) with the aim of defining the type of cotton plant and the system of cultivation best adapted to the ecological conditions and of mitigating the pluveometric deficit at end of growth cycle.

APPROACH: 1971 - Irrigation sprinkling. Experiment with 10 varieties, 2 different distances between rows, 2 dates of sowing, 4 rows per plot - 1972: Experiment with 11 varieties - 3 repetitions, 4 dates of sowing - 3 rows per plot. Behavior experiment with 33 varieties, 4 repetitions - 3 rows per plot - Irrigation by gravity - Paired experiment with two varieties, 2 sowing dates - 5 rows per plot. Control plots without irrigation.

FIRST RESULTS: 1) Interest of high density. 2) Advantage of varieties of short height, resistant to being beaten down.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0259, AGRONOMIC-VARIETAL EXPERIMENTS WITH COTTON (RAINFED CULTIVATION)
S. GOEBEL, (IV.061.0002)

OBJECTIVE: Varietal tests combined with mode of action of fertilizers. Research on production factors and on technological improvement.

APPROACH: 8 experiments with 4 varieties, 4 applications of fertilizer, 3 rows per plot, 2 repetitions. Interpretation by total analysis.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0260, VARIETAL IMPROVEMENT OF COTTON
S. GOEBEL, (IV.061.0003)

OBJECTIVE: To take advantage of the variability of interspecific HAR hybrids (G. hirsutum x arboreum x raimondii) in order to obtain commercial varieties.

APPROACH: 1) Establishment of a collection of HAR sires having extreme technological characteristics. 2) Crossing HAR x Allen (1959) and mass selection of pedigree type, with statistical lattice device for sampling of 100 specimens, 3 repetitions. System as free fertilization (pollination) destined to favour recombinations. 3) Re-crossing (1964) of HAR from the collection with the preceding material and selection of the same type. 4) Re-crossing (1971) of HAR from the collection with the material selected from the preceding experiment - for research combinations - for an independent diallele study (programme).

RESULTS: Replacement of the Allen 333 variety. 1 - The obtaining of variety 444-2 (HAR x Allen) propagated in the Ivory Coast territory in 1966 (improvement in length, picking yield). 2 - The obtaining of varieties L 299-10 (HAR x Allen, and L 231-24 (HAR x 244-2) destined for the replacement of 444-2 (improvement in tensile strength and micron index). 3 - The obtaining of varieties L 142-9 and L 229-29, which behave well in irrigated cultivation.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0261, VARIETAL EXPERIMENTATION WITH COTTON (RAINFED CULTIVATION)
S. GOEBEL, (IV.061.0004)

OBJECTIVE: Varietal tests destined for the choice of the best adapted cultivar.

APPROACH: 10 experiments with 10 varieties - 6 experiments with 5 varieties 1 row per plot - 3 rows per plot. Fisher blocks 6 to 10 repetitions - mineral fertilization, insecticide protection.

RESULTS: Propagation of variety 444-2.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0262, STUDY OF QUANTITATIVE HEREDITY IN A TRIPLE-HYBRID MATERIAL BETWEEN CULTIVATED SPECIES AND WILD SPECIES OF COTTON
J. SCHWENDIMAN, (IV.061.0005)

OBJECTIVE: Study of the transmission of principal characteristics in Gossypium hirsutum x G. arboreum x G. raimondii hybrids.

APPROACH: Diallele crossings on 8 basic parents. Factorial analysis on these 8 parents.

RESULTS: Determination of the heredity of the principal quantitative characters. Description of the 8 parental genotypes. Elaboration of non-correlated selection indices. Establishment of selection schemas.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0263, INTERSPECIFIC HYBRIDATION ON COTTON PLANTS BETWEEN CULTIVATED SPECIES AND WILD SPECIES
J. SCHWENDIMAN, (IV.061.0006)

OBJECTIVE: Creation of a triple-hybrid material Gossypium hirsutum x G. anomalum x G. herbaceum.

APPROACH: Crossings, study of the pairing of chromosomes, back- crossings on the cultivated parent, selection for fertility, self- fertilization (-pollination).

RESULTS: The obtaining of 60 stabilized progeny.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0264, STUDY THE HEREDITY OF QUANTITATIVE CHARACTERS IN A HYBRID MATERIAL DESCENDED FROM CROSSING BETWEEN CULTIVATED SPECIES OF COTTON

J. SCHWENDIMAN, (IV.061.0007)

OBJECTIVE: Study the transmission of principal characteristics in Gossypium hirsutum x G. barbadense hybrids.

APPROACH: Diallele crossings on 8 basic parents.

RESULTS: Determination on about ten characteristics of the effects of additivity, dominance and epistasis. Description of the 8 parental genotypes.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0265, INTERSPECIFIC HYBRIDATION ON THE COTTON PLANT BETWEEN CULTIVATED SPECIES

J. SCHWENDIMAN, (IV.061.0008)

OBJECTIVE: Stabilization of the crossing Gossypium hirsutum x G. barbadense and creation of recombined material.

APPROACH: Crossings, self-fertilization and stabilization by selection of recombined types. Study the transmission of qualitative and quantitative characters.

RESULTS: The obtaining of 50 progeny.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0266, EVOLUTION OF POTASSIUM IN THE COTTON-GROWING REGIONS OF THE IVORY COAST

M.J. DEAT, (IV.061.0009)

OBJECTIVES: To follow analytically the evolution of potassium in the soils and its influence on the yields in continuous cotton cultivation and on cultivation of cotton integrated into a crop rotation system.

APPROACH: 3 experiments withholding mineral fertilization, on sites distributed in the zones of cotton production for continuous cultivation.

2 crop rotations of cotton cotton-rice with or without 2 years of fallow afterwards, in the north zone with a sub-Soudanian tropical climate.

1 crop rotation of maize-cotton; maize-cotton; rice with or without two years of fallow afterwards, in the centre zone with a sub-equatorial climate of Baoule, for study within the framework of a crop rotation.

RESULTS: Introduction of potash into the fertilization routine. Adoption of a system of rotation.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0267, STUDY OF THE ACTION OF HERBICIDES IN THE CULTIVATION OF COTTON

M.J. DEAT, (IV.061.0010)

OBJECTIVE: Determination of herbicides efficiency in the cultivation of cotton in the conditions of the Ivory Coast.

APPROACH: Study of the preparations in 3 phases: Herbicidal efficiency of the preparations on weeds. Possible phytotoxicity of the efficient preparations for cotton plants. Economic study of those preparations that have successfully passed the first two tests.

This study is carried out on 4 sites distributed over the cotton-growing area.

RESULTS: Extension of herbicide preparations for popular use.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0268, STUDY OF THE ACTION OF TRACE ELEMENTS ON THE COTTON PLANT

M.J. DEAT, (IV.061.0011)

OBJECTIVES: Demonstration of the role of trace elements in the development of cotton plants. (Flowering, shedding, yields, technological qualities of the fibres).

APPROACH: Experiment carried out on hydroponic culture.

RESULTS: Introductions of trace elements into the popular routine use of fertilizers.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0269, ROLE OF NITROGENOUS FEEDING FOR THE COTTON PLANT

C. BOUCHY, (IV.061.0012)

OBJECTIVE: Increase of yields by complementary applications of nitrogen (when all other mineral deficiencies are corrected).

APPROACH: 4 trials with 7 materials (fractionated scatterings of urea) 8 repetitions - 4 rows per component plot (yields, petiolar diagnosis, curves of flowering, etc.).

RESULTS: Use by popularization (on 10,000 hectares in 1973) of a complementary application of urea (50 kg/ha) at flowering time, giving a yield-plus value of 200 to 300 kg/ha of cotton-seed.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0270, ROLE OF ORGANIC MATTER IN RELATION TO MINERAL FERTILIZATION IN THE PRODUCTION OF CROPS - MAIZE-COTTON

C. BOUCHY, (IV.061.0013)

OBJECTIVE: Development of fertility in the case of a continuous cultivation of maize-cotton (yields, foliar diagnosis, soil analyses) with the object of obtaining a stabilization of agriculture in tropical savannah.

APPROACH: Split-plot experiment - 6 materials - 8 repetitions - 6 rows per component plot - mineral fertilization, organic manure (2 applications), interaction of the two manurings.

RESULTS: Experiments in progress - definition of rates of application/hectare of mineral elements for an intensive production.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0271, MINERAL DEFICIENCIES OF THE COTTON PLANT

C. BOUCHY, (IV.061.0014)

OBJECTIVE: To define the evolution of mineral deficiencies in continuous cultivation of cotton; to study the correction of those deficiencies set up.

APPROACH: 20 withholding experiments on sites diffusely distributed over the entire cotton-zone. Fisher blocks - 4 rows per component plot - 6 materials with 8 repetitions - 5 consecutive years (1966 to 1970 inclusive). 1971 and 1972: Correction of these deficiencies.

RESULTS: Mapping of the mineral deficiencies and popularization of a formula for manure purely for cotton on 50,000 hectares.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

IVORY COAST

4.0272, EVOLUTION OF THE FERTILITY OF SOILS IN CROP ROTATIONS WITH OR WITHOUT FALLOW PERIODS

C. BOUCHY, (IV.061.0015)

OBJECTIVE: Evolution of fertility in an integrated system of cropping: cotton, food crop and forage crop; usefulness of fallow (natural or temporary prairie).

APPROACH: 3 permanent outstations (4 to 5 hectares per outstation) - 1 perennial withholding experiment (serving as a guide for fertilization of the rotations). Rotation I (continuous cultivation: cotton, cotton, rice or maize-cotton, maize, cotton, rice). Rotation II (same crops plus 2 years of fallow: natural or with Stylosanthes).

RESULLS: Start of popularization in the form of team and motorized cultivation (300 hectares).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0273, STUDY OF ANTHRACNOSIS OF KENAF - HIBISCUS CANNABINUS

J.C. FOLLIN, (IV.061.0016)

Host-parasite relation -Study the pathogenicity of Colletotrichum hibisci Poll. -Study the mechanisms of resistance of the plant.

Search for very productive resistant varieties -by mass selections from among tolerant to resistant varieties. By crossing between tolerant varieties and a variety totally resistant but having too long a vegetative cycle for practical use.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0274, STUDY THE DISINFECTION OF SEEDS

J.C. FOLLIN, (IV.061.0017)

Establishment of laboratory test for the study of simple preparations or those having endotherapeutic activity.

Study the action and the absorption by seedlings of the systemic fungicides; Benomyl, chloroneb, carboxine and thiophannates.

Determination of a non-toxic preparation as a substitute for the organic mercurial compounds.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0275, STUDY THE ROTTING DISEASES OF COTTON PODS IN IRRIGATED CULTIVATION

J.C. FOLLIN, (IV.061.0018)

Influence of cultural practices: Date of sowing; density.

Varietal influence: Intrinsic resistance. Resistance by association of particular morphological characters (okra leaves, frego bracts, nectar-less pods).

Influence treatments by growth-regulators acting on the morphology of the cotton plant.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0276, ACTION OF GROWTH-REGULATORS ON THE COTTON PLANT - SUBSTANCES WHICH INHIBIT GIBBERELLINS

J.C. FOLLIN, (IV.061.0019)

Action on the morphology of the cotton plant; Height and shape (interest of a reduced size for mechanical harvesting and resistance to being beaten down in irrigated cultivation).

Action on the yield and the technological characteristics of the fibres.

Action on the resistance to parasitism.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0277, BIOLOGICAL CONTROL OF CRYPTOPHLEBIA LEUCOTRETA

A. ANGELINI, (IV.061.0020)

Object: Biological control of Cryptophlebia leucotreta.

Approaches: Isolation of disease agents causing a cytoplasmic granulosis and a cytoplasmic virosis. Laboratory study of these viruses. Rearing of C. leucotreta in an artificial environment. Multiplication of the viruses.

Results: First field trials significant.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0278, BIOLOGICAL CONTROL OF HELIOTHIS ARMIGERA

A. ANGELINI, (IV.061.0021)

Objective: Biological control of Heliothis armigera.

Approach: Isolation of an agent causing a nuclear virosis. Laboratory study. Rearing the larvae in an artificial environment. Multiplication of the viral agent of the disease. First experimental work.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0279, CONTROL OF COSMOPHILIA FLAVA

A. ANGELINI, (IV.061.0022)

Objective: Control of Cosmophilia flava.

Approach: The setting up of several experiments including the use of chemical insecticides and of Bacillus thuringiensis. Observations on the development of this marauder in intensive cultivation.

Results: Good results with several chemical insecticides and with B. thuringiensis.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0280, SEXUAL ATTRACTION IN CRYPTOPHLEBIA LEUCOTRETA

A. ANGELINI, (IV.061.0023)

Objective: Utilization in biological control and as a warning sign.

Approaches: Demonstration of an attraction of the male towards the female. Construction of simple traps to be used in nature. Importance of the attraction.

In progress: Isolation of the pheromone and negotiations with specialized laboratories for the production of this pheromone.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0281, CHEMICAL CONTROL OF THE LEPIDOPTERA PARASITIC ON THE COTTON POD IN THE IVORY COAST

A. ANGELINI, (IV.061.0024)

Objective: Determination of the best chemical preparations, the concentrations to employ, the dates for application.

Approach: Carrying out each year 10 assays comparing about 50 preparations as chemical combinations. Daily sampling of shedding. Biological observations.

Results: Establishment of a protection against Heliothis armigera, Diparopsis watersi, Cryptophlebia leucotreta, Platyedra gossypiella.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0282, ECOLOGICAL OBSERVATIONS ON EARIAS SPECIES

R. COUILLOUD, (IV.061.0025)

Objective: Determination of the factors influencing the geographical distribution of the two species.

Approach: Collection of larvae in the field, rearing in natural conditions (cotton pods), determination of the imagos. Summaries of the climatic factors. Duration of the chrysalization cycle, larval parasitism, sex-ratios as a function of the different species and of the climatic factors.

Results: Primordial influence of maximal temperatures.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0283, STUDY THE DIFFERENT FACTORS WHICH INFLUENCE THE INDUSTRIAL PICKING YIELD OF COTTON IN THE IVORY COAST

J. ROCH, (IV.061.0026)

Objective: Series of experiments in the factory while the campaign is in progress.

Approach: Study the influence of speeds, of drying and of the conditions of humidity of the raw material. Study the factors influencing the cleaning of the fibre in factories equipped with cleaning machinery: the relation of combing, the level of dressing, weight of dressed cloth, weight of combed cloth.

Results: Definition of the best working conditions for the different machines, as a function of the processed raw material.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0284, TECHNOLOGICAL STUDY OF THE COTTONS OF THE IVORY COAST

J. ROCH, (IV.061.0027)

Objective: Qualitative study of commercially produced cottons.

Approach: The information will be obtained by laboratory analysis of a certain number of commercial samples furnished by the C.F.D.T.

The study will be: Regional, the number of samples analyzed will be proportional to the surface areas cultivated in the various production zones. Varietal, taking into account the different years when the seeds were set for multiplication.

Result: Will enable the making of a qualitative map of the cottons produced in the Ivory Coast.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

4.0285, ADAPTABILITY TO MECHANICAL HARVESTING OF CERTAIN VARIETIES OF COTTON PLANTS IN THE IVORY COAST

J. ROCH, (IV.061.0028)

Objective: Utilization of a mechanical harvester (Cotton Picker), its working efficiency, the quality of the cotton-seed harvested.

Approach: The trial will deal with the following three varieties: 444-2, 229-29 HAR, Delapine S.L. The trial allows for 3 repetitions. With each variety, determination will be made of: the working efficiency of the machine, the extraneous-matter content of the fibre obtained in comparison with manual harvesting.

Results: With the aim of the possible extension of this method of harvesting.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

STATION IRHO DE LA ME

B.P. 13, Bingerville

4.0286, FREEZE-DRYING THE POLLEN OF THE OIL PALM TREE

W.W. WUIDART, (IV.071.0001)

OBJECTIVE: To improve the length of storage life of the pollen by freeze-drying.

APPROACH: Adaptation of the technique of freeze-drying.

To study after different durations in storage, the viability of the pollen, the setting of the fertilized racemes, the percentage of normal embryos in the seeds and their germination.

RESULTS: Good vitality of the pollen with the following method of freeze-drying: drying for 24 hours, freezing at minus 85 degrees F for 15 minutes, sublimation for 2 hours, storage at 20 degrees to 22 degrees F.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0287, OIL PALM - STUDY THE CHARACTERS AND THE FERTILITY OF THE HYBRID E. MELANOCOCCA X E. GUINEENSIS

A. ARNAUD, (IV.071.0002)

Objective: To know the anatomical and cytological characters and the fertility of the hybrid Elaeis melanococca X E. guineensis and of its parents for the orientation of selection.

Approach: Anatomical and cytological study of the leaves, stipes and roots. Study of other characters of the vegatative and reproductive apparatus. Study of the fertility of the hybrid. Resistance to diseases. Analogies and differences existing among a population.

Results: Proof of an endodermal tannin-bearing layer in the roots which could explain the resistance of the roots to disease. Good fertility of the hybrids planted at present. Resistance to rotting of the trunk, caused by Coelaenomenodera elaeidis. Sensitivity to cercospora.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0288, IMPROVEMENT OF THE QUALITY OF PALM OIL (FIRST APPROACH)

W.W. WUIDART, (IV.071.0003)

OBJECTIVE: Research on hybrids presenting a composition rich in unsaturated fatty acids.

APPROACH: Establishment of methods of sampling; to study the composition in fatty acids of the material planted at La Me from 1962 to 1965, Elaeis guineensis; to study the composition in fatty acids of the hybrids Elaeis melanococca x Elaeis guineensis.

RESULTS: Mean fatty acid composition of palm oil: Elaeis guineensis: saturated equals 53.9 unsaturated equals 46.1; Elaeis melanococca: saturated equals 27.9 unsaturated equals 72.1.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0289, IMPROVEMENT OF THE MASCULINITY OF ELAEIS PISIFERA

W.W. WUIDART, (IV.071.0004)

OBJECTIVE: To improve the production of pollens of the Elaeis pisifera species by working on different factors.

APPROACH: To study the influence of the following factors: 1) Reduction of the foliar surface by periodic ablation of a proportion of the juvenile or adult oil palms; 2) Increasing the competition by doubling the density of trees per hectare; 3) Reducing the

moisture supply by covering the soil; 4) Reducing reserves by the development of parthenocarpic fruits by the use of a hormone.

RESULTS: Subject to reserve for obtaining confirmation; better production of pollen with severe pruning of useless leaves and in double density.

Better production of pollens at Pobe (Dahomey drier) - feminizing action of the juvenile leaves proven in the case of other plants.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0290, INTRODUCTION OF ELAEIS MELANOCOCCA - STUDY OF ITS INTERSPECIFIC HYBRID WITH E. GUINEENSIS

W.W. WUIDART, (IV.071.0005)

OBJECTIVE: To improve the current plant material by the introduction of new genes and characteristics proper to E. melanococca.

APPROACH: 1) Prospecting carried out or in progress: Brazil, Colombia, Costa Rica, Mexico, Panama, Surinam. 2) Introduction to La Me of different strains, cultivation of the envisaged populations. 3) Paternity test on the hybrid E. melanococca x E. guineensis and back cross on E. melanococca.

RESULTS: Characteristics of E. melanococca found again in the hybrid with E. guineensis: growth in height slow, resistance to certain diseases, richness of the oil in unsaturated fatty acids, probable adaptation to marshy zones.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0291, FERTILIZATION OF OIL PALM ON TERTIARY FERRALYTIC SANDS

Y. MOREAU, (IV.071.0006)

OBJECTIVE: Study the mineral deficiencies affecting the development and the production of oil palm plantations planted on severely desaturated ferralytic soils that have originated from tertiary sands, and the formulation of fertilizers which will enable them to be corrected.

APPROACH: Following up of the existing multilocal experiments and setting up of new experiments both on propagation and on replantation.

Study of the evolution of the contents in the various elements by means of foliar diagnosis and of the productions by individual yield.

RESULTS: The advantage of a nitrogenous and magnesium fertilizer is evident quite early in age of the plantation. Later, from the time of entry into production onwards, a potassium fertilizer modulated as a function of the foliar diagnosis and of the level of production, is beneficial. Some reparation of the magnesium and phosphate deficiencies, which most of the time are very localized, is also advantageous.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0292, FERTILIZATION OF OIL PALM ON FERRALYTIC SOILS THAT HAVE COME FROM GRANITE

P. QUENCEZ, (IV.071.0007)

OBJECTIVE: Study the mineral deficiencies affecting the development and the production of oil palm plantations planted on more or less desaturated ferralytic soils that have evolved from ante- Cambrian granite, and formulation of fertilizers that will provide for their correction.

APPROACH: Following up some experiments established on such soils.

Study of the evolution of the contents of the various elements by foliar diagnosis and of productions by individual yield.

RESULTS: No results to date. Experiments too recent.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0293, STUDY THE INFLUENCE OF THE ANIONS S04 AND CL IN THE FERTILIZATION OF THE OIL PALM

P. QUENCEZ, (IV.071.0008)

OBJECTIVE: Study the influences of the principal anions applied by manuring on the nutritional state of the oil palm and its development and thus on the production factors.

APPROACH: Research on the critical levels of the elements Cl and S in the leaf by setting up multilocal experiments applying the cations of standard manuring associated with the anions Cl and S04.

RESULTS: The optimal level of chlorine would be situated in the neighbourhood of 0.5%. Above this content, it is suitable to use potassium sulphate as potassic manure. In the Dabou savannah there exists in the young trees a deficiency in sulphur, the correction by magnesium sulphate procures a considerable increase in production, however little the potassium deficiency may be remedied.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0294, STUDY THE BEST TIME FOR APPLICATION AND FOR FRACTIONATED MANURING OF THE OIL PALM

Y. MOREAU, (IV.071.0009)

OBJECTIVE: Study the best season for a single annual application and the influence of fractionation of weak or strong applications made in July, December and March.

APPROACH: Application at the standard rate of potassic fertilizer at the following three times: July - December - March.

Application of a weak (half the standard rate) or a strong dose (double the standard rate) at one time only (July) or fractionated (1/3 in July - 1/3 in December - 1/3 in March).

RESULTS: The strong applications increase significantly the K contents of the leaves but have not yet had any effect on production.

The date of distribution and the fractionation appear to have had no effect.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0295, BALANCE THE SUPPLIES OF MANURE ON CLAY SOILS

J. OLIVIN, (IV.071.0010)

OBJECTIVE: Study the leaching of fertilizers in a tropical climate and the degree of fixation in clayey soils, with the object of choosing the methods of application: localization, fractionation, this balance of fertilizer supply conditioning their efficacy.

APPROACH: Creation of a laboratory for the study of artificial leaching on columns of earth and placing of a lysimeter in plantation as a means of studying leaching as a function of the concentration per surface unit. This study will bear on various fertilizers and various soils. Study fixation in clayey soils. These studies will be completed by analyses of leaves and of soil (these analyses being entrusted to an outside laboratory).

RESULTS: Programme is just beginning.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0296, OIL PALM - STUDY OF MINERAL BALANCES
R.O. OCHS, (IV.071.0011)

Objective: Study the assimilation by the young palm tree of various mineral elements; demonstration of mineral balances peculiar to this plant; and induction of deficiency for study of its manifestations.

Approach: Culture carried out under glass, in nutritive solution or in nursery bags to make it possible to control all the factors of nutrition with the maximum possible precision. The studies will cover: The induction of deficiency; the balance of ions in the leaves and roots as related to growth and metabolism; the action of the growth substances; the phenomena of phytotoxicity of fertilizers and pesticide products.

Results: Programme not yet begun.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0297, STUDY THE ROOT SYSTEM OF THE OIL PALM
B. TAILLIEZ, (IV.071.0012)

Objective: Study the root system in all its aspects: morphology, absorption, and seasonal activity, in order to determine the methods for application of mineral fertilizer and to ensure a better interpretation of fertilization experiments.

Approach: Visual observations, extraction of roots and weight analyses should allow study of the life-span of the roots, their seasonal evolution, and their rate of regeneration after division. How they compete with rhizome-bearing plants; the influence of genetic origin, of mineral manuring, of temporary or permanent hydromorphic structure.

Results: Greater density of absorbent roots under the interval between rows than under the trunk, and in particular, under the interval between rows with a swath. Interesting observations have been made on the comparative anatomy of Elaeis guineensis and E. melanococca: existence in the latter of cells having walls rich in tannin which might be responsible for the superior resistance of E. melanococca to penetration by various pathogenic organisms.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0298, STUDY THE NUTRITION OF THE OIL PALM IN WATER
B. TAILLIEZ, (IV.071.0013)

Objective: Study the physiology and factors of production of oil palm in the absence of a moisture deficit, as a function of types of plant material, and determination of the quantities of water to be supplied in order to realize an industrial oil palm plantation in regions with an important moisture deficit.

Approach: Comparison of 2 types of industrial crossing with or without moisture deficit in the conditions of La Me: sexual different- iation, abortion, foliar emission, number of green leaves, quantitative and qualitative factors of production. Study irrigation in very marginal conditions, definition of the criterion on which may be determined the frequency that is technically the most profitable, as well as the quantities of water to be supplied in order to realize an industrial oil palm plantation under these conditions.

Results: Increase of 66 percent in the production at Grand-Drewin (average over 7 years). At La Me, comparable increase for the first two production campaigns.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0299, STUDY THE MINERAL NUTRITION OF OIL PALM ACCORDING TO THE PLANT MATERIAL
B. TAILLIEZ, (IV.071.0014)

Objective: Study the mineral fertilization necessary for the highly improved plant material (more than 4 tons per hectare of palm oil) which will be produced by 1975.

Approach: Foliar diagnosis studies, attempt to demonstrate differences in the N, P, K, Ca, Mg, S, Cl content between categories of crossing and progeny. As a function of these results, it will be possible to determine the critical levels adapted to the selected plant material produced in large quantity for a given hybrid (hybrids obtained by the use of sires which are the issue of self-fertilization of proven trees). An experiment will then be set up to study the mineral manuring needed to maintain these critical levels as a function of the plant material.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0300, INFLUENCE OF THE MICROCLIMATE AND OF MINERAL FERTILIZATION ON NURSERIES OF OIL PALMS IN BAGS
R.O. OCHS, (IV.071.0015)

Objective: Research on the causes of the disease known as blast - cultural tecniques; microclimatic conditions. Research on technical means of suppressing or reducing the shade (to date, the only means in use for control of blast).

Approach: Influence of variations in temperature and humidity produced by: (a) density of shade; (b) application of irrigation; (c) different types of bags. Staggering the dates for pricking-out (in search of an opening - a gap - without blast); disinfection of the planting mould; speeding up of development (mineral fertilizations).

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0301, REGENERATION OF SOILS AND FERTILIZATION IN REPLANTATION OF OIL PALMS
B. TAILLIEZ, (IV.071.0016)

Objective: To define a policy of regeneration of soils by supplying organic matter and basic mineral fertilizer before re- plantation of oil palm and to adjust the applications of fertilizer after replantation.

Approach: Utilization of plants producing a large quantity of organic matter (Guatemala grass) in comparison with the standard cover plants. To set up experiments on mineral manuring at time of replantation. Observations bearing on vegetative development, the contents in mineral elements of the leaves, and on production.

Results: Demonstration of a nitrogen deficiency in palms replanted in land regenerated with Guatemala grass.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0302, STUDY OF ASSISTED POLLINATION OF THE OIL PALM
J. OLIVIN, (IV.071.0017)

Objective: Necessity for and economic advantage of assisted pollination. Influence of prolonged assisted pollination on sexual differentiation.

Approach: Different methods of pollination. Production recording (number and weight of racemes). Inspection of sexual differentiation (counting of the inflorescences). Inspection of failures (abortions) and of the quality of the setting of the racemes.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

IVORY COAST

4.0303, STUDY OF CASTRATION OF THE OIL PALM

R.O. OCHS, (IV.071.0018)

Objective: Influence of suppression of the first inflorescences on the vegetative growth of the young palm tree and on the factors affecting the production of oil, number (sexual differentiation), mean weight and oil content of the racemes. Determination of the optimum duration of castration, and also of the best season to allow entry into production.

Approach: Systematic suppression of all the inflorescences, whatever their sex, at the earliest stage possible. Measurement of the vegetative development, recording individual yields, and determination of the rate of extraction.

Results: The first experiments have shown that castration had a favourable influence on the weight of the first harvests while acting on the mean weight of the racemes. It can release the season of coming into production in a more favourable period than the end of the long dry season and makes it possible to allow the trees to come into production only if they have attained sufficient development.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0304, BIOLOGY OF COELAENOMENODERA ELAEIDIS, OIL PALM PEST

D. MARIAU, (IV.071.0019)

Objective: Given a good knowledge of the biology of the insect, establish appropriate methods of control.

Approach: Development and reproduction of the marauder. By artificial infection of palms under muffs, the removal of samples at fixed dates. Description and duration of each stage of development. Placing of adults in cages, enumeration of eggs laid each week. Rate of hatching. Population dynamics of the marauder and of its parasites. Study of mortality. Regular (weekly) collection of samples in different types of plantations, description of the stages encountered (dead - parasitized - destroyed by predators - alive).

Results: The duration of the cycle is 95 days (44 days for the 4 larval stages). The reproduction potential is about 350 eggs per female without great variation in the course of the annual cycles. In a state of pullulation there is not a spread of populations like that produced in a state of endemicity. This non-recovery of generations does not favour the development of the 3 main local parasites, Achrysocharis leptocerus (eggs), Sympiesis aburiana and Pediobius setigerus (larvae of the 4th stage).

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0305, APPLICATION OF METHODS OF CHEMICAL CONTROL AGAINST COELAENOMENDOERA ELAEIDIS FOR OIL PALM PROTECTION

D. MARIAU, (IV.071.0020)

Objective: Control of populations of Coelaenomenodera with the aid of insecticide preparations.

Approach: Research on new preparations to control the different developmental stages of the insect (Larvae - adults). The most favourable periods for treatment. Adjustment of material (apparatus) in order to obtain a satisfactory distribution of the insecticide in the crown of the tree. Influence of the treatments on the parasitic and predatory fauna of Coelaenomenodera.

Results: Numerous insecticides have been tested against both the larvae and the adults. The most effective treatments have been carried out on the young larval stages after oviposition and before the appearance of the nymphs. Parathion is one of the most effective of the insecticides with a not too high cost. The I.R.H.O. in collaboration with the Tecnoma Society has demonstrated an apparatus, Le Fludair canons Jumeles (the twin-gun Fludair) very well adapted for palm plantations of all ages. One or a few treatments do not unduly disturb populations of natural insect enemies of Coelaenomenodera.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0306, REARING OF COELAENOMENODERA ELAEIDIS IN AN ARTIFICIAL ENVIRONMENT

D. MARIAU, (IV.071.0021)

Objective: To be able to have readily available in large numbers in laboratory conditions, individuals of Coelaenomenodera at different stages of development so as to practice mass rearing of the parasites.

Approach: Studies of the entomologist in charge of this work in specialized laboratories. Application to the insect in question of methods habitually used for rearing different species of Lepidoptera on artificial media. Studies of the composition of the medium and of the means of making it available to the insect.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0307, METHODS OF BIOLOGICAL CONTROL OF COELAENOMENODERA ELAEIDIS

D. MARIAU, (IV.071.0022)

OBJECTIVE: To ensure a permanent biological control of populations of the marauder by introductions of exotic parasites.

APPROACH: Local biological study and rearing of the parasites - Missions to Latin America and to the Far East with a view to a search for parasites susceptible to being introduced into the parasitic complex of Coelaenomenodera. Local studies of these parasites. Rearing and studies of introduced insects, at first in insulated cells with variable temperature, hygrometric conditions and lighting. In favourable cases, dispersion of the parasites in palm plantations. Study of behaviour in natural conditions.

RESULTS: Study of the indigenous larval parasites has shown that these had a narrow parasitic spectrum and were not in a state to strangle a pullulation before it had caused a severe defoliation. Pleurotropis parvulus has been introduced from the New Hebrides, its rearing carried out in the laboratory; but its behaviour (parasitic spectrum, sex-ratio, parthenogenesis) when faced with Coelaenomenodera has been very different from that which it adopts towards its original host (Promecotheca).

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0308, STUDY OF THE CHARACTERISTICS OF THE RACEME AND OF THE FRUIT OF THE OIL PALM TREE

W.W. WUIDART, (IV.071.0023)

OBJECTIVE: To study the variations of the characteristics of the raceme and the fruit as a function of different factors.

APPROACH: Monthly variations of the characteristics of the raceme and the fruit as a function of: age of the trees, seasons, production and climatology - position of the raceme in the cycles; stage of maturity.

RESULTS: At present, analysis of the racemes over two years at the rate of 3 analyses per month and per crossing. The racemes are harvested on the average at 5 per 100 fruits detached after cutting.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0309, PROSPECTION AND INTRODUCTION OF OIL PALMS OF AFRICAN ORIGIN

W.W. WUIDART, (IV.071.0024)

OBJECTIVE: Introduction of new materials with a view to enlarging the genetic variability of the current material.

APPROACH: Prospecting and introduction of new materials in the form of seeds and pollens: test of sires with the other strains, genealogical fields. Zones prospected: Yocoboue (Ivory Coast), Angola, material from Ekona and Lobe (Cameroun), Zaire, Sibiti (Congo- Brazzaville) Nigeria.

RESULTS: Richness in pulp, Yocoboue. Stout racemes, resistance to fusariosis, Angola. Richness in oil, Ekona. Resistance to fusariosis, Lobe. Good combinations obtained with the Deli (strains) originating from Zaire, Sibiti and Nifor, already introduced.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

STATION IRHO DE PORT BOUET

B.P. 7013, Abidjan - Aeroport

4.0310, IMPROVEMENT OF THE PRODUCTIVITY OF THE COCONUT PALM

M. DENUCEDELAMOTHE, (IV.072.0001)

OBJECTIVE: To improve the productivity of the coconut palm. Its precocity and production of copra and of oil.

APPROACH: Research on the best types of hybrids. Test the general aptitude for the combination of varieties. Research on the best hybrids of each type - reciprocal recurrent selection.

RESULTS: The obtaining of earlier and more productive hybrid coconut palm. At 10 years, the hybrid coco-tree (dwarf x large) has produced 18.5 tons of copra per hectare as against about 9 tons for the local material. Since 1969, a great number of new comparative experiments with hybrids have been set up, the results should permit the release to planters a further improved material.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0311, PROSPECTING FOR AND INTRODUCTION OF COCONUT PALM

M. DENUCEDELAMOTHE, (IV.072.0002)

Objective: To increase the collection of plant material suitable for utilization in the programme of improvement of the coconut palm production.

Approach: Prospecting in Asia (Indonesia - Philippines) and Latin America; pre-prospecting with a view to determining the zones to study; prospecting and utilization of the material retained; shipment of nuts and of pollen.

Results: The Port-Bouet station already possess a collection of 40 varieties introduced from other countries.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0312, IMPROVEMENT OF TECHNIQUES FOR PRODUCTION OF HYBRIDS OF COCONUT PALM

M. DENUCEDELAMOTHE, (IV.072.0003)

Objective: To improve the techniques for production of hybrids.

Approach: Study of the dispersion of pollen and isolation of seed production fields. Improvement of the technique for directed natural fertilization. Establishment of a method of assisted pollination with the object of producing hybrid seeds. Utilization of insects as pollinating agents. Study the possibilities of concentration of the seed production upon period of the year determined in advance. All these studies necessitate a great number of field experiments.

Results: In the absence of insects having a long range of activity (bees), a seed production field is sufficiently isolated by 200 metres of forest to enable its use. The technique of directed natural fertilization is utilized on a large scale; the number of rogues (illegitimate progeny) varies from 1 to 5 percent; a trial is in progress, the aim is to reduce this percentage still more.

Assisted pollination is yielding its first results; progress will need to be made in the domain of labor economy and of pollen.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0313, FERTILIZATION OF THE COCONUT PALM - FERRALYTIC SOILS ON TERTIARY SANDS

P. COOMANS, (IV.072.0004)

Objectives: Study mineral nutrition on young dwarf x semi-large local hybrids. Principal effects and interactions between the elements P-K-Mg.

Approach: 3 factorial experiments studying the elements N-P-K-Mg at 3 levels. Plant material: hybrid (dwarf x large).

Results: 1) Foliar diagnosis: nitrogen is significantly absorbed. Phosphorus is not significantly absorbed. Applications of potassium depress the phosphorus contents. Potassium is significantly absorbed with an effect according to quantity applied. The application of urea depresses the K contents. Calcium: the application of bicalcium phosphate augments the Ca contents; that of potassium and of kieserite depresses them. Magnesium is significantly absorbed. It is depressed by potassium chloride. Sodium: the applications of potassium and of kieserite depress, significantly, the Na contents. Chloride: potassium chloride increases, significantly, the chloride contents with an effect according to quantity applied. 2) Growth: K has significant action on the circumference at the "collar" (25 percent), the number of leaves and the number of folioles. Mg has significant action on the circumference at the "collar" (at the first application) and on the number of leaves (at the second application only). N shows an increase in the circumference at the "collar" and in number of folioles. P has a positive influence on the number of leaves at the first application only. 3) First conclusions: necessity of a complete and balanced manuring for coco-trees at a young age.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0314, FERTILIZATION OF THE COCONUT PALM ON LITTORAL FERRALYTIC SOILS

P. COOMANS, (IV.072.0005)

Objective: Study the mineral nutrition and of the fertilization of the local coconut palm and hybrids planted on littoral ferralytic soils.

Approach: 6 factorial experiments studying the elements N - P - K and Mg.

Results: Necessity of providing potassium from the moment of planting of young coco-trees on littoral sands. When the levels of K are satisfactory, the application of phosphate is indispensable if the contents in the leaves fall below 0.120 percent. Positive effect of magnesium on production when the contents are less than 0.300 percent. Existence of a positive correlation between chloride and yield. Applications of potassium and of bicalcium phosphate are highly profitable.

IVORY COAST

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0315, FLORAL BIOLOGY OF THE COCONUT PALM

M. DENUCEDELAMOTHE, (IV.072.0006)

Objective: Given a better knowledge of the floral biology of the coconut palm. Improve the possibilities of utilizing the pollen.

Approach: Study the technique of collection of pollen (isolation and influence of the microclimate in the isolation bags). Adaptation of the technique of freeze-drying to the pollen of the coco-tree. Conditioning and transport. Influence of various treatments on the pollination potential.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0316, STUDY OF K/MG BALANCE IN THE MANURING OF THE COCONUT PALM

P. COOMANS, (IV.072.0007)

Objects: To specify the development of K-Mg antagonism. Study of increasing applications of K and of Mg.

Action of magnesium deficiency on production and research on the correction of this deficiency.

Approach: Four-square factorial experiment studying the elements K and Mg at 4 levels.

Results: To obtain the maximum production, the level of K has to be between 0.8 and 1.0 and that of Mg between 0.250 and 0.300.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0317, OBSERVATION OF THE CHARACTERS OF PRODUCTION OF THE COCONUT PALM

M. DENUCEDELAMOTHE, (IV.072.0008)

OBJECTIVE: Establishment of a method for sampling and determination of copra per nut. Study the measurable content of oil and the quality of this oil.

APPROACH: Study the various components of the fruit (fibre, shell, moisture, albumin) and determination of the sample to be collected. Comparison of methods for determination of oil (oleometer and Soxhlet). Study the fatty acid and amino acid composition.

RESULTS: It will not be possible to draw the first conclusions until after the end of the 3rd year of observations.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0318, STUDY OF CALCIUM IN THE FERTILIZATION OF THE COCONUT PALM

M. OUVRIER, (IV.072.0009)

OBJECT: To determine the critical level of calcium as a function of relations with K and Mg.

APPROACH: Factorial experiment on local material 4 x 4 x 2 studying K and Mg at 4 levels and Ca at 2 levels - N and P are constant.

RESULTS: The experiment having been set up in 1972, it is necessary to wait at least five years to have the first results.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0319, STUDY OF THE ROLE OF THE ANIONS SO4 AND CL IN THE FERTILIZATION OF THE COCONUT PALM

P. COOMANS, (IV.072.0010)

OBJECTIVES: To study the action of chloride and of sulphur on the nutrition of the coco tree.

APPROACH: 1 experiment on local adult coconut palms, studying the action of the anions SO4 - Cl - NO3. 1 experiment on hybrid coconut plants in plastic bags on a nursery, studying the chloride - sulphate balance.

RESULTS: Experiments too recent; it is necessary to wait a year to obtain the first results.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0320, STUDY FORMS OF NITROGENOUS FERTILIZERS FOR THE COCONUT PALM

P. COOMANS, (IV.072.0011)

OBJECTIVE: To study different forms of nitrogenous fertilizers: ammonium sulphate; urea; ammonium nitrate; ammonium chloride.

APPROACH: Orientation experiment on coco plants reared in plastic bags.

RESULTS Obtained in nursery: Ammonium chloride: circumference at the collar significantly inferior; causes burns; increases the Cl contents in the leaves. Ammonium suphate: augments the sulphur contents in the leaves of hybrids; existence in the hybrid alone of a correlation between sulphur content/circumference at the collar; no significant action on the local coco plant; augments the contents of sulphur equall well in the hybrid material and in the local coco plant. Identical action of the nitrogenous fertilizers on the N contents of the leaves.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0321, STUDY FORMS OF PHOSPHATE FERTILIZERS FOR THE COCONUT PALM

P. COOMANS, (IV.072.0012)

OBJECTIVE: To study the different forms of phosphate fertilizers.

APPROACH: One experiment comparing bicalcium phosphate to tricalcium phosphate. Orientation experiments on coconut plants reared in plastic bags.

RESULTS obtained in nursery: Tricalcium phosphate gives contents in P inferior or equal to those given by bicalcium phosphate. The simple superphosphate gives higher contents than does bicalcium phosphate. Tricalcium phosphate and the simple superphosphate set up burns due to a toxicity of fluorine.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0322, STUDY THE TIME OF APPLICATION AND FRACTIONATION OF MANURINGS FOR THE COCONUT PALM

P. COOMANS, (IV.072.0013)

Objective: To compare the fractionated application of fertilizers and the application made once only on different dates. To study the rates of application of N, K, Mg.

Approach: Factorial experiment of 3x2x2x2x2 type (three modalities of distribution - two levels of N, K, Mg).

Results: The mode of distribution has a very striking effect on the Cl, S and Mg contents. Distribution carried out at the beginning of the rainy season gives the weakest contents in Cl and S. For Mg the highest contents are obtained with fractionated distribution carried out at the beginning and at the end of the rains.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0323, STUDY THE ROLE OF TRACE-ELEMENTS IN THE NUTRITION OF THE COCONUT PALM
P. COOMANS, (IV.072.0014)

Objective: To study the role of trace-elements in the nutrition of the coconut palm.

Approach: Study manganese, boron, copper and molybdenum on adult trees of the local variety. Study boron on young hybrid and Rennel coconut palms.

Results: On quaternary sands of the seashore, there is no deficiency in Mn, B, Cu and Mo in adult trees. Manganese and boron are significantly absorbed, copper is not. On tertiary sands, existence of a deficiency in boron in young hybrid coco-trees, which appears to be connected with the cultural antecedents and the mode of preparation of the ground.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0324, STUDY THE ROOT SYSTEM OF THE COCONUT PALM
M. OUVRIER, (IV.072.0015)

Object: To determine from which stage onwards fertilizers can be applied mechanically on a coconut palm plantation.

Approach: Examination of the root systems of coconut palm aged: 5 years; 4 years; 3 years; 2 years. Number of trees studied per age: 30.

Results: The study has just commenced, the first results will be available in a year.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0325, STUDY OF CONSERVATION OF THE SEEDS OF THE COCONUT PALM
M. DENUCEDELAMOTHE, (IV.072.0016)

Objective: To inhibit germination of the coconut palm seeds for a more or less lengthy period in order to be able to set plantations at the favourable period for optimum development.

Approach: Realization of experiments in the storage of nuts while making variations in the following factors: humidity; temperature; ventilation. Studies the differences in behaviour.

Results: Storing in a climatic controlled room enables conservation of coconuts for 4 months without their germinative ability being affected.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0326, STUDY OF DENSITY AND PLANTATION ARRANGEMENT FOR COCONUT PALM
M. OUVRIER, (IV.072.0017)

Object: To determine the optimum density of plantation for hybrid dwarf x large material.

Approach: Study of five densities (110 to 180 trees/ha) according to an arrangement in Fisher blocks - 6 repetitions.

Results: None for the moment, for the experiment is not yet in production.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0327, CONTROL OF ORYCTES IN THE IVORY COAST
J.F. JULIA, (IV.072.0018)

Objective: To find means of limiting the pullulation of Oryctes.

Approach: Study the biology and feeding habits and the mode of reproduction of the marauder. Experiment in chemical control. Experiment in biological control (virus and attractants). Study the populations of Oryctes in plantations which have had different degrees of clearing. Comparison of various techniques for preparing the ground and study the attacks.

Results: A technique has been established for chemical control. A method of sampling enabling precise estimation of the level of the populations and calculation of the damage has been used experimentally with success. It has been discovered that Pueraria, with which it is possible to cover the undestroyed trunks, provides a considerable reduction in the larval populations of Oryctes. A first result, encouraging enough, has been obtained in the laboratory, concerning the study of the virus for use in biological control.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

4.0328, STUDY THE RESISTANCE OF THE COCONUT PALM TO HELMINTHOSPORIOSIS
M. DENUCEDELAMOTHE, (IV.072.0019)

Objective: To detect at an early stage the susceptibility to helminthosporiosis of the different types of crossings. To follow possible modifications of susceptibility up to the entry into production. To study the mode of transmission of resistance.

Approach: Carrying out crossbreeding between healthy individuals and affected individuals of resistant and susceptible varieties. Self- fertilizations. Inoculation test in nurseries. Observations.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - I.C.

STATION PISCICOLE CTFT DE BOUAKE

B.P. 621, Bouake

4.0329, STUDY THE MECHANISM OF THE GENETICS OF HYBRIDATION OF TILAPIA SPECIES
PLANQUETTE, (IV.044.0001)

Objective: Demonstration of the mechanism leading in certain interspecific crossings to obtaining fry of exclusively male sex in order to be able to favour this mechanism in other types of intra- or interspecific crossings. The aim of the application is to set up breeding units for enlargement from which reproduction is excluded.

Approach: Biological study of Tilapia species. Selection of species. The regular obtaining of all-male hybrids by crossings of T. hornorum and T. nilotica.

Results: Sterile hybrids of T. hornorum and T. nilotica.

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

4.0330, STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES
PLANQUETTE, (IV.044.0002)

Objective: Study the piscicultural management of extensive water reserves in the course of construction (in particular the Kossou dam). The original ichthyological population no longer corresponds to the possibilities offered by the new lake environment.

Introduction of new populations likely to make the maximum use of the possibilities of the environment is essential.

Approach: Preliminary studies of the fish population. Stocking with fry of Tilapia nilotica and Heterotis niloticus. Study the new populations.

Results: Inspection of the production in the old dams (Ayame, le Kan).

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

STATION REGIONALE IFCC D'ABENGOUROU

B.P. 147, Abengourou

4.0331, MINERAL FERTILIZATION ON COFFEE
J. SNOECK, (IV.136.0001)
Network project - see IV. 132.0032 (4.0145)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0332, STUDY THE TRAINING (PRUNING) OF THE COFFEE-SHRUB ROBUSTA
J. CAPOT, (IV.136.0002)
Network project - see IV. 132.0002 (4.0118)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0333, STUDY OF DENSITIES AND ARRANGEMENTS FOR PLANTATION OF THE CACAO-TREES
J. CAPOT, (IV.136.0003)
Network project - see IV. 132.0003 (4.0119)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0334, GENERATIVE IMPROVEMENT OF THE CACAO-TREE
J. BESSE, (IV.136.0004)
Network project - see IV. 132.0004 (4.0120)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0335, MINERAL FERTILIZATION ON COCOA
J. SNOECK, (IV.136.0005)
Network project - see IV. 132.0033 (4.0146)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0336, IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY VEGETATIVE MEANS
J. CAPOT, (IV.136.0006)
Network project - see IV. 132.0006 (4.0122)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0337, IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY GENERATIVE MEANS
J. CAPOT, (IV.136.0007)
Network project - see IV. 132.0007 (4.0123)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0338, IMPROVEMENT OF COFFEE-SHRUBS BY INTRASPECIFIC HYBRIDATION
J. CAPOT, (IV.136.0008)
Network project - see IV. 132.0008 (4.0124)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0339, STUDIES OF DENSITIES AND ARRANGEMENTS IN PLANTATION OF THE COFFEE-SHRUB ROBUSTA
J. CAPOT, (IV.136.0009)
Network project - see IV. 132.0009 (4.0125)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0340, RESEARCH FOR HYBRID VARIETIES OF CACAO HAVING A GOOD APTITUDE FOR ESTABLISHMENT AND A HIGH DEGREE OF DROUGHT TOLERANCE
J. BESSE, (IV.136.0010)
Network Project - See IV. 132.0010. (4.0126)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0341, IMPROVEMENT OF THE COLA TREE
J. CAPOT, (IV.136.0011)
Network Project - See IV. 132.0027. (4.0140)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0342, STUDY THE RESPONSE OF ELITE HYBRID CACAO-TREES TO MINERAL FERTILIZATION
J. BESSE, (IV.136.0012)
Network Project - See IV. 131.0014. (4.0111)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

4.0343, RESEARCH ON CACAO CLONES OR INTERCLONAL HYBRIDS PRESENTING A DISTINCT TOLERANCE TO PHYTOPHTHORA PALMIVORA
J. BESSE, (IV.136.0013)
Network Project - See IV. 132.0013. (4.0129)

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Abidjan, I.C.

STATION SYLVICOLE CTFT DE BOUAKE

B.P. 695, Bouake

4.0344, RELATIONS BETWEEN SOIL AND GROWTH FOR PRINCIPAL SPECIES FOR FORESTRY PLANTATIONS
F. WENCELIUS, (IV.042.0001)

Objective: To define the relative requirements as to the soil factor of the principal species utilized in forestry plantations in the Ivory Coast.

Approach: Launching of the project on Teak. Systematic studies of plantations of different ages in different zones of the Ivory Coast: on the one hand, study of the productivity of the plantations, on the other hand of the essentially physical characteristics of the soils studied. Exact relationship between soil and dominant trees (small sites for trees of a single species). Comparison of savannah zones with forest zones. Influence of bed-rock.

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

4.0345, STUDY CLEARINGS IN FORESTRY PLANTATIONS OF HIGH PLANTATION DENSITY

F. WENCELIUS, (IV.042.0002)

Objectives: To define, first of all for teak, the object of important plantations in the Ivory Coast, the rhythm, intensity and type of clearings to be carried out.

Approach: Setting up arrangements for study of clearings in new plantations (CCT plots, etc.). Observations of old arrangements on old plots.

Results: Establishment in 1971-72 of provisional rules for the first clearing. First conclusions on medium term arrangements. Modalities for application of the provisional rules on new plantation blocks.

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

4.0346, SCALE OF PRICES OF CUBAGE WITH DOUBLE ENTRY FOR TEAK - TABLE OF TEAK PRODUCTION IN THE IVORY COAST

F. WENCELIUS, (IV.042.0003)

Objectives: To establish a cubage tariff with double entry which will make it possible to apply this tariff to the whole of the teak populations of the Ivory Coast. To set up a table of production of teak for the Bouake zone.

Approach: In 1973, starting from all the cubages of the preceding years, construction of a double-entry tariff in 1973, setting up the first temporary small planting spots for the construction of the table of production.

Results: Establishment of cubage tariffs on the whole of the plots for study of teak in the Ivory Coast.

SUPPORTED BY Centre Tech. For. Trop. - Abidjan, I.C.

LIBERIA

BOTANICAL RESEARCH DEPARTMENT OF FIRESTONE PLANTATIONS COMPANY

Harbel

5.0001, TAPPING SYSTEMS ON HEVEA VARIETIES

M.H. WELLINGTON, (LI.031.0001)

The experiments in this project are designed to determine optimum tapping systems on Har 1, Har 43, PR 107 and BD 5.

The randomized tree plot design is being used in all the experiments.

There seems to be no significant difference in yield between periodic and alternate daily tapping.

The optimum opening diameter seems to be 6.1 inches at 60 inches above the bud union.

Full spiral, fourth daily tapping is producing yields equal to half spiral, alternate daily tapping and slightly less than S/2, 10d/20 tapping.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0002, ETHREL STIMULATION OF HEVEA VARIETIES

M.H. WELLINGTON, (LI.031.0002)

The experiments in this project are designed to determine Ethrel stimulation procedures on Har 1, Har 43, BD 5 and Tjir 1.

The randomized tree plot design is being used in all experiments.

Experimental results indicate Ethrel is superior to 2,4-D.

Ethrel in combination with reduced intensity tapping systems is producing yields equal to unstimulated S/2, d/2 tapping.

Ethrel is applied to a lightly scraped two inch band below cut.

Above cut application of Ethrel holds promise.

Various concentrations of Ethrel in Palm Oil, and Ethrel in water are being tested. Amchems 10% Ready Mix with Penetrant is also being tested.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0003, BREEDING AND SELECTION OF HEVEA BRASILIENSIS FOR HIGH YIELD AND IMPROVED SECONDARY CHARACTERISTICS

L.F. EBELL, (LI.031.0003)

Objectives: Continuous improvement of latex yield and of cultural characteristics such as vigor, bark quality, general conformation, resistance to wind damage and to leaf and panel diseases.

Approach: Through genetic combination of desirable parental qualities, by hand pollinations and by open pollinations in duoclone, isolated seed gardens. Progeny are cloned in 7-tree lines, replicated twice. Selections are made by age 10 to 14, then tested on 1/4 acre plots, replicated 4 times, where earlier performance can be confirmed and statistically superior clones recommended for estate use.

Progress: Preliminary test is underway for many full third cross clones, as well as combinations of primary clone, first second and third cross parents. Harbel clones 1 to 123 are in larger scale trials. Some of the first half have proven equal or superior to available commercial clones and have taken their turn for past and present estate use. Evaluation of the second half continues.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0004, FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON GROWTH

B.V. SCHERRENBURG, (LI.031.0004)

Objective: To determine the economically optimum rate and composition of fertilizer mixtures at different growth stages.

Approach: In field experiments with randomized plot designs different N, P, K and Mg mixtures and rates are compared. Height and girth measurement are taken to determine growth rates.

Leaf samples taken to determine leaf nutrient, (N, P, K, Mg and Ca) contents.

Progress: Rock phosphate mixed with the soil of the planting hole stimulated early growth.

At different growth stages girth increments in treatments with N, P, K, and Mg mixtures were importantly higher than in unfertilized controls.

A trace element application (2 oz FTE 171/tree/year) seems to decrease growth rates.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0005, FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON YIELD

B.V. SCHERRENBURG, (LI.031.0005)

Objective: To investigate the effect of different fertilizer mixtures on rubber yields.

Approach: In field experiments with randomized plot designs, different N, P, K, Mg mixtures are compared. Yields are recorded each month.

Leaf samples are taken to determine leaf nutrient (N, P, K, Mg and Ca) contents.

Progress: Fertilization during the immature period resulted in a considerable yield gain over unfertilized controls. Fertilization of trees in tapping gave statistically non-significant yield increases and decreases.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0006, SOUTH AMERICAN LEAF BLIGHT RESISTANCE SCREENING

I.P. GAUT, (LI.031.0006)

Objective: To develop a laboratory test for screening seedlings of Hevea brasiliensis for resistance to the fungus Microcyclus ulei.

Approach: 1. Chromatography of phenolics in leaf extracts. 2. Injection of cell-free fungal extracts.

Progress: Just started.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0007, PINK DISEASE CONTROL IN HEVEA BRASILIENSIS

I.P. GAUT, (LI.031.0007)

Objective: To develop an effective and economical control method for Pink Disease of Hevea brasiliensis, caused by the fungus Corticium salmonicolor.

Approach: Field trials of different fungicides in latex concentrate as a durable carrier, for slow release of fungicide over several months. Mixtures are painted over the affected parts of naturally infected trees.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0008, COMPUTERIZATION OF ROUTINE DISEASE CONTROL WORK RECORDS - HEVEA PLANTATION

I.P. GAUT, (LI.031.0008)

Objective: To store and process all records of disease control work on the plantation through a central computer. Eleven secondary objectives include checking efficiency of control methods, checking disease incidence and spread, and performance or cost-benefit analyses.

Approach: A specially designed form will be given to all men in charge of disease control work, on which they will record numbers of trees in various disease categories per 40 acre block. Completed forms will be submitted monthly for card-punching and processing. Regular print-out will show compiled record for whole plantation and other relevant details.

Progress: Design stage completed. About to start field trial.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0009, BLACK THREAD CONTROL WITH DIFOLATAN AND ETHREL

I.P. GAUT, (LI.031.0009)

Objective: To assess if it is possible to apply the latex stimulant Ethrel in combination with the fungicide Difolatan, for control of Black Thread (Phytophthora palmivora) in Hevea brasiliensis.

Approach: Field experiment with various mixtures applied above, or above and below the tapping cut.

Progress: Just started.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

5.0010, COLLAR CANKER CONTROL IN HEVEA BRASILIENSIS

I.P. GAUT, (LI.031.0010)

Objective: To find most economical treatment for collar canker (thought to be caused by Pythium vexans).

Approach: Field experiment of several treatments, with and without fungicide application.

Progress: Just started.

SUPPORTED BY Firestone Plantations Co. - Harbel, Lib.

CENTRAL AGRICULTURAL EXPERIMENT STATION SUAKOKO

Suakoko

5.0011, SWINE BREEDING

A. RATHORE, (LI.012.0001)

Objective: To observe the performance of Hampshire swine and to carry out selective breeding.

Approach: To record the growth of animals and to carry out selective breeding.

Progress: The herd is still in the process of being increased to a sufficient number to have adequate opportunity for selection.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0012, OBSERVATIONS ON GROWTH AND PERFORMANCE ON NUBIAN GOATS

A. RATHORE, (LI.012.0002)

Objective: To observe the growth and performance of Nubian goats in Liberia

Approach: To protect the animals from tsetse fly and by using Trypanosomiasis suppressants and to observe and record their growth and physiological norms

Progress: Six nubian goats were obtained. Data on their growth, breeding. Temperature and pulse is being collected. Protection is given against Trypanosomiasis by using Berenial and Antrycide. The flock had increased to ten by new births. But recently it has been reduced to three females by deaths on account of error in administration of medicine. The project may have to be terminated.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0013, STUDY OF RICE DISEASES

A.J. CARPENTER, (LI.012.0003)

Objective: To identify the various diseases of rice and to study the resistance of various varieties to these.

Approach: For rice blast (Pyriculera oryzae) the international blast nursery tests, using standard varieties from IRRI. For other diseases observations.

Progress: A large number of varieties have been screened from blast disease. Observations have been made on other diseases including those on the physiological condition of "bronzing" which is probably due to iron toxicity. Work is continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0014, STUDY OF RICE PESTS

A.J. CARPENTER, (LI.012.0004)

Objective: To study the pest damage in rice and to find methods of reducing the damage.

Approach: Observation of damage due to various pests; insects, rodents, birds. Trying out various control measures to test their efficacy.

Progress: Use of insecticides, fencing with chicken wire to prevent rodent damage and use of nets to check bird damage are being tried and their usefulness being assessed.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0015, VARIETAL TRIALS ON IRRIGATED RICE

A.J. CARPENTER, (LI.012.0005)

Objective: Development or identification of high yielding rice varieties for conditions in Liberia

Approach: Conventional methods; starting with blast resistance nursery testing and up replicated observation plots. The promising varieties then to be tried in replicated plots.

Progress: A large number of varieties obtained locally from adjoining countries and from research organizations like IRRI have been tried. Some promising varieties have been identified. The trials are continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0016, STUDY OF WEEDS IN IRRIGATED RICE

A.J. CARPENTER, (LI.012.0006)

Objective: To identify the common weeds in irrigated rice in Liberia and to screen various weedicides and methods of application and costs.

Approach: Observation and identification of weeds followed by replicated trials comparing clean weeded, partially weeded and unweeded plots with those protected by use of herbicides comparing yields against costs of various types of weeding.

Progress: Common weeds have been identified. Various herbicides, their dosages and methods of application have been studied and compared with hand weeding. Yields and costs are compared. Work is continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0017, FERTILIZER STUDIES ON IRRIGATED AND UPLAND RICE

A.J. CARPENTER, (LI.012.0007)

Objective: To relate fertility of swamp and upland soils to yields; to study the response to added nutrients under various cultural conditions and varieties; to study methods, periods and forms of application and to study methods of improvement of sandy swamps.

Approach: Factorial and other trials, bucket tests, soil analysis

Progress: Numerous trials have been carried out using varieties, plant nutrients, methods of application, dosage, time of application etc. have been carried out. Costs have been studied. The work is continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0018, COSTS AND METHODS OF DEVELOPING SMALL SWAMPS FOR RICE CULTIVATION

R. FIGUEROA, (LI.012.0008)

Objective: To establish the best combination of machinery and labour inputs and to ascertain comparative costs of developing small swamps for rice cultivation.

Approach: Various methods of clearing, levelling and laying out small swamps for rice cultivation; usage of hand tools and power equipment are tried. Records of costs maintained.

Progress: Total of 1.04 hetares of swamp land has been developed using various methods. The work is continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0019, VARIETAL TRIALS ON UPLAND RICE

A.J. CARPENTER, (LI.012.0009)

Objective: Identification of high yielding upland rice varieties for conditions in Liberia

Approach: Trials on local varieties and those obtained from adjoining countries and other research institutions to find the most promising varieties. These, to be studied more intensively.

Progress: One very promising variety has been identified in trials spread over a wide area. Work with more varieties is continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0020, GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS

J.D. FREEMAN, (LI.012.0010)

Objective: To study the germination and growth of various fruit seeds in Liberia

Approach: Seed of tropical fruits are obtained from regions having comparable climates.

Progress: Seeds of eighteen different types of tropical fruit plants from several sources have been obtained and tried. These were: Avocado (India), *Cashew, Ceylon apple, *Chickoo (Manila), Cocoa, *Durian, *Flacortia, *Guava, *Mango, Mangostein, *Papaya, *Passion fruit, *Pomogranate, *Rombutan, *Sour sop, *Sweet sop, *Tropical Olives, *Wood apple. Thirteen successful ones (marked with an asterisk) have been planted in an orchard covering an area of 10.8 hectares. The work is continuing.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0021, OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE

A. RATHORE, (LI.012.0011)

Objective: To observe the growth and performance of exotic cattle in Liberia

Approach: To protect the animals from tsetse fly and by using trypanosomiasis suppressants. And to observe and record their physiological norms and growth.

Progress: A total of twelve young animals belonging to six different breeds were obtained. These are, Aberdeen Angus 2, Brown Swiss 2, Jersey 1, Holstein Friesian 2, Santa Gertrudis 2, Zebu (Brahman) 3. Data on their growth, breeding and temperature and pulse is being collected. Protection is given against common cattle diseases and against ticks. Berenil and Antricide are used for protection against trypanosomiasis.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0022, FISH-RICE COMBINATION AND ROTATION STUDIES

P.D. YOUN, (LI.012.0012)

Objective: To grow fish and rice together and also to grow them in rotation.

Approach: Observation on plots in which fish and rice are grown together and on plots in which a fish-rice rotation is followed as compared to control plots.

Progress: One set of trials using, Tilapia melanopleura and Tilapia macrochir in mixed culture, have been completed for observation. More are to be conducted. The same fish would be used.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0023, SOIL ANALYSIS AND CLASSIFICATION

J.S. KERVAH, (LI.012.0013)

Objective: To analyse soil samples to classify the soil and to make land-use recommendations.

Approach: Soil samples are analysed. The results together with additional information from the location is used to classify the soil and to make recommendations.

Progress: The work is of a continuing nature. Mechanical analysis as well as chemical analysis for C,N,K,P and pH in water and kel is carried out.

The data are being accumulated to provide information on the soils of Liberia.

SUPPORTED BY Central Agri. Experiment Station - Liberia

5.0024, SELECTED ECONOMIC ASPECTS OF EXPANDING RICE PRODUCTION IN LIBERIA, MAINLY IN UPPER LOFA AND BONG COUNTIES

C.E. VANSANTEN, (LI.012.0014)

Objective: To indicate social economic potentials and constraints of expanding rice cultivation Liberia.

Approach: To carry out agro-socio-economic surveys in selected regions of the country (Lofa & Bong).

Progress: Tentative studies of appraisal of economic aspects of rice production have been prepared and at present an additional survey is carried out to complete the picture.

SUPPORTED BY Central Agri. Experiment Station - Liberia

MALI

CELLULE EXPERIMENTALE IRCT DE KOGONI

Kogoni par Niono

6.0001, EXPERIMENTAL WORK WITH VARIETIES OF THE COTTON PLANT GOSSYPIUM BARBADENSE

A. TANGUY, (ML.021.0001)

OBJECTIVE: Research on the possibilities of cultivating "long silk" cotton plants (Gossypium barbadense) in irrigated culture.

APPROACH: Introduction of foreign cultivars. Selections of varieties resistant to Bacteriosis (black-arm). Tests of dates for sowing and of densities. Research on possible resistance to Earias insulana.

RESULTS: Pima S 4 (origin U.S.A.) shows promise.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0002, INTEGRATED CONTROL OF EARIAS SPECIES

G. PIERRARD, (ML.021.0002)

OBJECTIVE: Definition of an integrated control campaign against Earias spp. for the irrigated cultivation of Gossypium barbadense.

APPROACH: Study of the population dynamics of the ravagers. Evaluation of entomophages. Definition of the factors limiting the multiplication of entomophages. Mass release of the entomophages.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

CENTRE NATIONAL DE RECHERCHES FRUITIERES DE BAMAKO IFAC

B.P. 30, Bamako

6.0003, INDUSTRIAL TRANSFORMATION OF FRUITS

B. SAKO, (ML.041.0001)

Objective: To ensure improvement of the fruits produced, an increase and a diversification of the fruit crops.

Approach: Study of the production of essential oils from oranges extracted from natural populations. Quality of the essential oils of bergamot and of lime (distillation). Study of mango products, preserves and drinks. Pilot production unit destined for sampling the possible products and to study their commercialization.

Results: Obtained: commercialization of essential oils. Awaited: New possibilities for diversification of fruit production.

SUPPORTED BY Inst. de Rech. Fruit. Outre Mer - Mali

6.0004, ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE

P. JEANTEUR, (ML.041.0002)

Objective: Definition of the species of fruit crops adapted to the climatic zone, their performances and the utilization of the products.

Approach: Specific experimental arrangements, situated in mesoclimatic sites chosen for the study of the adaptability of species of fruit crops cultivated in homogenous or associated populations: mango trees, citrus fruit trees, guava-trees, pineapples, banana, avocado-tree (Sikasso), grenadilla (passion-fruit), cashew-tree, strawberry vine.

Results: Obtained: Improvement of existing populations of orange- trees on the plateaux of Fauta Djallon, by the launching of an operation for production of essence of orange pith extracted in the cold. Renewal of the citrus fruit orchard by the introduction; the multiplication and distribution of planting material certified free from the principal known virus diseases and representing the best commercial varieties. Definition of the modes of irrigation with a view to a directed production of citrus fruit. Diversification of the crops as a function of the suitability of the different climatic zones for fruit- growing (pineapples, banana, varieties of mangoes for export). Awaited: Definition of the techniques for cultivation with a view to the creation of agro-industrial unit-types of production.

SUPPORTED BY Inst. de Rech. Fruit. Outre Mer - Mali

CENTRE TECHNIQUE OICMA DE KARA MACINA

B.P. 136, Bamako

6.0005, RESEARCH ON THE AFRICAN MIGRATORY LOCUST

M.M. HUSSEINY, (ML.200.0001)

Objective: Operational studies on appropriate preventive measures for strengthening the efficiency and reducing the cost of the control campaign against the African migratory locust Locusta migratoria migratorioides.

Approach: Research on the biology, the ecology, the population dynamics, the influence of meteorology and of other environ-

mental factors upon the behaviour of the African migratory locust, and on the control methods used against this insect.

Result: Preparation and printing of an ecological map of the area over which swarms are formed, in order to facilitate research, surveillance and control.

SUPPORTED BY Org. Intl. Ctr. Criq. Migrat. Afr. - Mali

DIRECTION REGIONALE IRCT POUR LE MALI

B.P. 114, Bamako

6.0006, EXPERIMENTAL CULTIVATION OF COTTON-PLANTS WITHOUT GOSSYPOL

M. COSTARD, (ML.020.0001)

OBJECTIVE: The obtaining of cultivars without glands containing gossypol, having superior commercial characteristics and seeds that can be utilized in human nutrition.

APPROACH: Multilocal experimental work with introduced varieties. Tests of their behaviour particularly when faced with predatory fauna.

RESULTS: Experimental cultivation in rural environment on 85 hectares.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

SECTION DES ESSAIS MULTILOCAUX

B.P. 281, Bamako

6.0007, DATE OF SOWING IN RICE-FIELDS FOR SEMI-CONTROLLED SUBMERSION

M. DIAKITE, (ML.111.0001)

OBJECTIVE: Determination of the optimal date as a function of the probable date of arrival of the floods.

APPROACH: Study of the vegetative behaviour and of the yield of the two principal varieties in popular use, KHAO GAEW and NAN KIEW, as a function of the interval between sowing and arrival of the floods.

RESULTS: Experimental work too recent for any conclusions to be drawn.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0008, DATE OF SOWING OF CEREALS IN DRY CULTIVATION

M. DIAKITE, (ML.111.0002)

OBJECT: To see the influence of the date of sowing on the yield of cereals and determination of the optimal date for different ecological conditions.

APPROACH: The experiments are made in accordance with Fisher block arrangements. In dry cultivation the experiments are made mainly on sorghum and are planted up in the different ecological zones. An attempt is made to determine the optimal date as a function of the first useful rain.

RESULTS: Experimental work too recent for any conclusions to be drawn.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0009, THE FERTILIZATION OF RICE

M. DIAKITE, (ML.111.0003)

OBJECTIVE: To seek to define the potentialities of the environment in the cultivation of rice.

APPROACH: Comparative experiments following the arrangement in Fisher blocks: a) with application of increasing quantities of phosphates in the presence of a N, K, S complement. b) with increasing applications of nitrogen in the presence of a P, K, S complement.

RESULTS: Covering a reduced number of sites. Positive effect of a balanced fertilization. Depressant effect of an excess of phosphorous.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0010, FERTILIZATION ON GROUNDNUTS AND ITS RESIDUAL EFFECTS

M. DIAKITE, (ML.111.0004)

OBJECT: Research for the mineral formula ensuring the best return and study of a possible residual effect on the cereal which follows.

APPROACH: Comparative experiments in rotation (Arachis - sorghum) in Fisher blocks implanted in the different productive zones. Application at increasing rates of basic fertilizer (principally simple superphosphate) to the Arachis crop with or without application of nitrogen, in the second year Sorghum.

RESULTS: (Applying to restricted number of sites). Direct effect on arachis: the strong applications are equivalent to the popularized rate (60 kg of simple superphosphate to the hectare). Residual effect: the nitrogenous fertilization seems to have no effect on the sorghum except in the case of fertilization of the Arachis at a rate superior to the popularized rate: (3 fields only).

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0011, VARIETAL EXPERIMENTS ON RICE

M. DIAKITE, (ML.111.0005)

OBJECT: To determine the variety to be popularized in each condition of cultivation (pluvial varieties of rice, erect varieties for low-lying or irrigated fields, floating varieties of rice).

APPROACH: The experiments are made according to the arrangment of FISHER blocks: Experiments with erect and floating varieties of local and foreign origin with different depths of water from 30 - 170 cm. Comparative experiments with pluvial varieties of rice.

RESULTS: Experimental work too recent (two campaigns) for conclusions to be drawn from it.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0012, VARIETAL EXPERIMENTAL WORK ON GROUNDNUTS

M. DIAKITE, (ML.111.0006)

OBJECT: On the one hand to search for varieties significantly superior to the current popularized varieties and suitable for replacing them, and on the other hand to seek the limit of ecological adaptation between the early and late varieties.

APPROACH: Tested collection of a large number of varieties following the arrangement in student pairs. Limit of distribution

experiments: comparison between two early and late varieties following the arrangement of FISHER blocks.

RESULTS: For a period of several consecutive years and on the Experimental Stations as a whole, the current popularized varieties, 47 - 10, as an early variety and 28 - 206, as a late variety have not yet been outclassed by new varieties. Experimental work too recent as far as the "limit of distribution" experiments are concerned, for any conclusions to be drawn from it.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0013, VARIETAL EXPERIMENTAL WORK WITH MAIZE

M. DIAKITE, (ML.111.0007)

OBJECT: To find varieties with a high yield in the field.

APPROACH: In each place of experiment, the local population is compared with other and foreign varieties, following the arrangement in FISHER blocks.

RESULTS: Good behaviour of two foreign varieties, yellow composite from BOUAKE (CJB) and white from Senegal (BDS) but in the course of the last two years only, which will probably take the place of the popularized varieties (Tiemantie and Zanguerini).

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0014, VARIETAL EXPERIMENTAL WORK WITH SORGHUM

M. DIAKITE, (ML.111.0008)

OBJECTIVE: To determine the most productive varieties in each ecological zone.

APPROACH: The experiments are made in accordance with the FISHER block arrangement. Comparison of selected Mali and foreign varieties with the local variety as late and early sorghum. Comparison of 4 improved "DURRA" populations (panicles like croziers with large seeds) with the variety cultivated locally in the Saheli zone.

RESULTS: Among the late sorghums two recent Mali selections SH1D3 and SH2D2 compete with the formerly selected variety Tiemarifing. Among the early sorghums, good behaviour of a few new varieties (12 - 6A; 12 - 7A; 137 - 62 and SH11D1). The experiments are being followed up with the object of isolating the most productive for popularization. The improved varieties of DURRA sorghum seem to be of interest. Experiments for confirmation necessary for 2 or 3 years more.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

6.0015, VARIETAL EXPERIMENTAL WORK WITH PENNISETUM MILLETS

M. DIAKITE, (ML.111.0009)

OBJECT: To find the varieties that are best adapted for each of the ecological zones.

APPROACH: In each place of experiment the local population is compared with other Mali varieties following the arrangement in FISHER blocks.

RESULT: Good behaviour for the Mali varieties M9 in the 800 and 1000 metre (altitude) zones and M2 in the 400 to 600 metre (altitude) zone.

SUPPORTED BY Inst. d' Economie Rurale - Bamako, Mali

SOUS-STATION IRAT DE KITA

B.P., Kita

6.0016, CREATION OF MAIZE HYBRIDS WITH WHITE SEED AND WITH YELLOW SEED

L. SOUMARE, (ML.063.0001)

National network project - see ML.061.0005 (6.0069)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0017, STUDY THE EFFECTS OF THE NATURAL PHOSPHATE OF TILEMSI (MALI) ON ANNUAL CROPS

F. JENNY, (ML.063.0002)

National network project - see ML.061.0006 (6.0070)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0018, POTENTIALITY OF TROPICAL SOILS - RESPONSE TO K

F. JENNY, (ML.063.0003)

Objective: Determination of the exact time of potassium shortage in soils under cultivation and the amount required to compensate K uptake and maintain optimal nutrition.

Approach: Determination of K response curve with 5 doses of K from 0 to 160 kg/Ha at the beginning of a quadrienal rotation involving maize, groundnuts, sorghum, groundnuts. N-P- supplements to each crop.

Results: No direct nor residual effects of K on the first three crops of the rotation. A residual effect on sorghum has been noted on straw yields.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0019, POTENTIALITY OF TROPICAL SOILS - RESPONSE TO NITROGEN

F. JENNY, (ML.063.0004)

Network project - see ML.067.0005 (6.0053)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0020, MAINTENANCE OF FERTILITY IN CROPPING SYSTEMS

F. JENNY, (ML.063.0005)

Network Project - see ML.061.0008 (6.0072)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0021, RESEARCH ON FERTILIZATION OF GROUNDNUTS

F. JENNY, (ML.063.0006)

Network Project - see ML.064.0002 (6.0048)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0022, POTENTIALITY OF TROPICAL SOILS - PHOSPHORUS RESPONSE

F. JENNY, (ML.063.0007)

Network project - see ML.067.0007 (6.0055)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

SOUS-STATION IRAT DE SENO

B.P., Seno

6.0023, STUDY OF THE EFFECTS OF THE NATURAL PHOSPHATE OF TILEMSI (MALI) ON ANNUAL CROPS

F. JENNY, (ML.062.0001)

Network project - see ML.061.0006 (6.0070)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0024, STUDY OF THE EFFECTS OF TILLAGE

F. JENNY, (ML.062.0002)

Objective: Comparison of the different types of tillage and of their influences on the evolution of the soils.

Approach: Comparison on a large plot of the tillage with the team- drawn plough (ploughing), the pronged cultivator (scraping out) and the traditional work with the hoe. This is carried out in dry cultivation on a rotation of maize - arachis on the Sub-station of SENO and on monocultivation of aquatic rice on the Sub-station of SIKASSO. The effect of these factors on the evolution of the soils and of the crops in the presence or absence of a mineral fertilization.

Results: Work in its first year - no results as yet.

Network project: See ML. 065.0002.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0025, EVOLUTION OF SOILS UNDER CULTIVATION

F. JENNY, (ML.062.0003)

Network project - see ML.065.0003 (6.0031)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0026, POTENTIALITY OF TROPICAL SOILS - RESPONSE TO NITROGEN

F. JENNY, (ML.062.0004)

Network project - see ML.067.0005 (6.0053)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0027, MAINTENANCE OF FERTILITY IN CROPPING SYSTEMS

F. JENNY, (ML.062.0005)

Network project - see ML.061. 0008 (6.0072)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0028, POTENTIALITY OF TROPICAL SOILS - PHOSPHORUS RESPONSE

F. JENNY, (ML.062.0006)

Network project - see ML.067. 0007 (6.0055)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

SOUS-STATION IRAT DE SIKASSO

B.P. 20, Sikasso

6.0029, STUDY OF THE EFFECTS OF THE NATURAL PHOSPHATE OF TILEMSI (MALI) ON ANNUAL CROPS

F. JENNY, (ML.065.0001)

National Network Project - see ML 061.0006 (6.0070)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0030, STUDY OF THE EFFECTS OF TILLAGE

F. JENNY, (ML.065.0002)

Network project - see ML.062.0002. (6.0024)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0031, EVOLUTION OF SOILS UNDER CULTIVATION

F. JENNY, (ML.065.0003)

Objective: To follow the evolution - both chemical and physical - of soils under cultivation, in the zones where intensive agriculture is practised.

Approach: On the sub-station of SIKASSO under rice and at SENO under millet. On the plains for Rice Operations (plains of DIORO, SAN and MOPTI - South). To carry out observations (cultural profiles) each year at beginning and end of cycle, samplings of soil and in situ measurements to specify the chemical and physical characteristics of the arable layer, comparing them either with a control, or with the observations and analyses carried out previously.

Results: The first observations and analyses are still too recent and insufficient in number for it to be possible to draw precise conclusions from them concerning the intensification of rice-growing on the soils of the plains of Bani, Niger and the low- lands of SIKASSO.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0032, INNRODUCTIONS AND BEHAVIOUR TESTS OF PLUVIAL RICE

P. MARTIN, (ML.065.0004)

Objective: To determine the varieties of pluvial rice adapted to this type of cultivation for the region of SIKASSO (recorded rainfall 1,200 mm).

Approach: Some introductions of pluvial rice have been made. Some tests of behaviour enabling a choice of the best adapted varieties. The criteria for selection are: Appropriate growth cycle (100 to 120 days) and resistance to prolonged periods of drought. The resistance to piriculariosis is not yet an essential criterion.

Results: The exceptional character of the year 1972 does not permit any conclusions to be drawn from the experiments undertaken. The dates for sowing will have to be specified.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0033, INTRODUCTION AND TESTS OF BEHAVIOUR OF RICE ON LOW LYING INUNDATED LAND - STUDY OF THE TECHNIQUES OF CULTIVATION FOR THE SIKASSO REGION

P. MARTIN, (ML.065.0005)

Objective: To determine the varieties best adapted for inundated rice- fields.

Approach: The local varieties and the introduced varieties are compared in behaviour experiments. The various modes of plantation are compared - direct sowing, pricking out. The criterion for selection retained are: Tolerance to submersion lasting for some days, appropriate growth cycle (140 to 160 days), tolerace to a maximum sheet of water of 1 metre.

Results: D52-37 and Segadi are the two most productive varieties at present.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

STATION AGRONOMIQUE DE SAME

B.P. 84, Kayes

6.0034, WATER BALANCE OF RAIN-FED CROPS AT KENIEBA (MALI)

D.A. RIJKS, (ML.801.0001)

Studies of frequencies of deficits and surpluses in the water balance of rain-fed rice-growing at Kenieba, Mali.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0035, IMPROVEMENT OF THE CROPPING TECHNIQUES IN TRADITIONAL AGRICULTURE

V.U. NGUYEN, (ML.801.0002)

Objective: Improvement of the cropping techniques of regional traditional agriculture: rain-fed crops, flood-watered crops, paddy rice growing - association with livestock raising. Rationalization of vegetable growing.

Approach: Experiments at agronomic stations - demonstration plots in rural areas.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0036, COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH

D.A. RIJKS, (ML.801.0003)

International Network Project - See SG. 801.0007. (11.0008)

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0037, AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN

D.A. RIJKS, (ML.801.0004)

International Network Project - See SG. 801.0008. (11.0009)

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0038, SELECTION OF THE BEST ECOTYPES OF LOCAL SORGHUM

V.U. NGUYEN, (ML.801.0005)

Objective: Selection of the best ecotypes of Keninke-Diansa local variety for use.

Approach: Choice of 6 ecotypes and comparison with original and improved progeny.

Results of the 1972 campaign: 1) Improved progeny of a mixture of equal parts of the three best ecotypes: 2510 kg/ha. 2) Original progeny of a mixture of equal parts of the six ecotypes: 1135 kg/ha.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0039, CHOICE OF THE BEST IMPORTED VARIETIES OF SORGHUM

V.U. NGUYEN, (ML.801.0006)

Objective: Selection of the best introduced varieties, adapted to the SAME-KAYES area.

Approach: Collection and comparative variety trial (Student's test, Fisher randomized blocks) on late and semi-late sorghum, high and short straw.

Results: Orientation of selection for semi-late sorghums as follows: Varieties of Mali: SH11D1; 12-6A; 12-71; Keninke-Diansa. Varieties of Niger: Babadia-Ja; Gourma; Nongosaba; 137-62. Varieties of Upper-Volta: Americano-Voltaiques. Varieties of Senegal: CEQO.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0040, CEREAL BREEDING - PEARL MILLET

V.U. NGUYEN, (ML.801.0007)

Selection of the best varieties adapted to the region. Collection and comparative intervariety trials. Varieties to be confirmed: 1) Mali: M2D2, MG, NKK. NBK, NBBxM9. 2) Haute-Volta: Zalla. 3) Niger: P3 Kolo. 4) Senegal: Soma III. 5) Nigeria: Ex-Bornou. Test on disease resistance to Scleropora graminicola, Claviceps microcephala and Tolyposporium penicillars

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0041, CEREAL BREEDING - MAIZE

V.U. NGUYEN, (ML.801.0008)

A. Selection of the best local ecotypes: 29 ecotypes have been tested during two campaigns in 1971-1972. Comparative trials on the 3 best varieties to be conducted in 1973.

B. Collection and inter-regional comparative trials: To be confirmed in 1973, selected varieties in Senegal (ZM10), BDS et JDSO in Mali (Zanguerini, Tiemantic de Zamblara) and in Dahomey (NH1).

C. Variety trials to be established in flood recession cultivation.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0042, CEREAL BREADING - RICE

UNKNOWN, (ML.801.0009)

Selection of the best erected and floating rice varieties under flood control. Trials to be established on erected rice: Segadis, D52.37, Gambiaka, HKG 98, Phar-Com-En. On floating rice: Malobadian, Nang Kew, Khao Griew, Mali Sawn.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0043, OILSEED PLANT BREEDING - GROUNDNUTS

V.U. NGUYEN, (ML.801.0010)

Collection and comparative trials to screen the best late and early varieties.

Results to confirm: Early varieties (90 days): (H7-10 (Already extended), (55-437). Late varieties (120 days): (28-206), (59-127).

Experimentation orientated on semi-late varieties: 57.422; v.40; 70-112 and 70.111; (105 days cycle).

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0044, FIBRE CROP BREEDING - COTTON

V.U. NGUYEN, (ML.801.0011)

Selection of the most productive and best adapted varieties for the 1st region of Kayes to replace pluriannual cotton.

Comparative varietal trials: H.A.R. and derived varieties; B.J.A. 592; American varieties: Stoneville, Cockes.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0045, FODDER CROP IMPROVEMENT

V.U. NGUYEN, (ML.801.0012)

Selection of the best adapted fodder crops varieties for crop-livestock farming system in the region Kayes.

Grasses: Paspalum sp., Pennisetum, Gayanus, Panicum maximum, Digitaria sp., Rottboelia, Hyparrhenia. Legumes: Dolichos, Stilozobium, Phaseolus. The fodder crop collection is established in liaison with the Guede Station, (Senegal - SG.801).

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

6.0046, INTER-RELATION BETWEEN SOIL PREPARATION AND LEVEL OF FERTILIZATION

V.U. NGUYEN, (ML.801.0013)

Objective: Study the interrelationship between soil preparation techniques and level of fertilization. Study of crop rotation to define the most profitable cropping systems.

Approach: Determination of mineral requirements. Comparison of different cropping techniques (without tillage, superficial tillage, tillage with draught animal and tractors). Crop rotation including groundnuts and cotton. Determination of the residual effects of fertilizers.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

STATION IRAT DE KATIBOUGOU

B.P. 16, Koulikoro

6.0047, CREATION OF MAIZE HYBRIDS WITH WHITE SEEDS AND WITH YELLOW SEEDS

L. SOUMARE, (ML.064.0001)

National Network Project - see ML.061.0005 (6.0069)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0048, RESEARCH ON FERTILIZATION OF GROUNDNUTS

F. JENNY, (ML.064.0002)

Objective: Determination of economic fertilizaation of groundnuts at the request of operational development, taking into account current prices in Mali. Tentative to obtain an economic residual effect of fertilizer application on cereals following groundnuts. Study on the incidence of such low level of fertilization on the evolution of soils fertility.

Approach: Trials on direct and residual effect of three doses of superphosphate on crop rotation groundnut-sorghum with or without supplement of nitrogen on the cereal crop. Annual low level fertilization on crop rotation groundnut-sorghum, superphospate and superphosphate plus KCE on groundnut and two N plus P applications on sorghum.

Results: Slight residual effect on cereals with superphosphate applied at 65kg/ha on the precedent crop. Requirement of NP fertilizer application on sorghum; residual effect on sorghum from high doses of superphosphate applied on groundnut. Groundnut is not influenced by high doses of phosphate.

Network project: See ML. 063.0006.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

STATION IRAT DE KOGONI

B.P. Kogoni, par Niono

6.0049, SELECTION OF LINES OF SORGHUM OBTAINED FROM OTHER COUNTRIES HAVING THE SAME ECOLOGY

L. SOUMARE, (ML.067.0001)

Network project. See ML 061.0007. (6.0071)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0050, CONTROL OF WEEDS ON IRRIGATED RICE-FIELDS, PARTICULARLY ISCHAEMUM RUGOSUM AND THE WILD SPECIES OF RICE PLANTS

P. MARTIN, (ML.067.0002)

OBJECTIVE: To find efficient means of controlling the principal weeds of irrigated rice-fields in Mali.

APPROACH: Different methods are compared: chemical control or cultivation techniques. The emphasis is placed on research for appropriate techniques. The study of the efficacity of pre-irrigations, of different forms of preparation of the soil and of various modes of conducting the irrigation.

RESULTS: An agricultural type of calendar has been proposed. The research work is being continued in order to find other effective solutions.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0051, COLLECTION AND INTRODUCTION OF VARIETIES OF RICE FOR IRRIGATED CULTIVATION TEST FOR ADAPTATION

P. MARTIN, (ML.067.0003)

OBJECTIVE: to select the varieties that are best adapted to the ecological conditions of the region served by the Niger, the principal zone of irrigated rice cultivation in Mali.

APPROACH: Some introductions of foreign varieties have been completed. Tests for adaptation and varietal experiments are instrumental in the choice of the most productive varieties.

RESULTS: The varieties distributed are: Segadis, D52-37, Gambiaka Kokum, HKG 98, Kading Thang, Phar Com En and Doc Phung Lun. 15 varieties are still at the stage of comparative experiments.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0052, STUDY THE CROSSINGS WITH SOME IRRI VARIETIES FROM VARIETIES OF IRRIGATED RICE WITH LONG STRAW

P. MARTIN, (ML.067.0004)

OBJECTIVE: To obtain varieties with shortened straw and with very high productivity, starting from varieties of good technological quality but having long straw.

APPROACH: Two varieties, the issue of a crossing of HKG 98 by Kading Thang have been crossed in 1970 with IR 22. In 1971, five crossings have been effected with two other descendants of a crossings of HKG 98 with Kading Thang. The descendants are followed in genealogical selection for the criteria of short straw, long grain, good productivity by good type of plant, tolerance to insects.

RESULTS: The selection is proceeding.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0053, POTENTIALITY OF TROPICAL SOILS - RESPONSE TO NITROGEN

F. JENNY, (ML.067.0005)

Objective: To test direct effect (on rainfed cereals and rice) and secondary effect (on groundnuts) of 5 increasing doses of N in crop rotation, the phosphorus deficiency of the soils being corrected.

Approach: On rainfed cereals, 5 doses of N from 0 to 150 u/Ha - On cereal-groundnut rotation; each crop in the rotation receives optimum P- K-S doses. On rainfed rice crop, 5 doses of N and complementary supplements of P205 each year.

Results: For Maize and Rice, increasing yields of grains for doses of fertilizers from 0 to 150 u/Ha. No significant response for Rice between 150 and 200 u/Ha. For millet (at SENO) no more increase in yields from 120/Ha. N on cereals has no residual effect on subsequent groundnuts in the rotation.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0054, SPECIFIC ROLE OF ORGANIC MATTER IN SOILS, FERTILITY

F. JENNY, (ML.067.0006)

Objective: Restitution of rice and cereal straw into the soil to avoid losses of this important quantity of minerals and to maintain and improve soil fertility. To follow up with the evolution of soil physical properties and fertility.

Approach: Establishment of a response curve to N with or without burying organic matter from crop residues at the level of 10 T/Ha of dry matter. Doses of Nitrogen vary from 0 and 200 Kg/Ha of N, with K fertilizers complements.

Results: No positive yield effect of organic matter with N during the first year, slight depressive effects of organic matter.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0055, POTENTIALITY OF TROPICAL SOILS - PHOSPHORUS RESPONSE

F. JENNY, (ML.067.0007)

Objective: Determination of P doses to be applied on soils with P deficiencies, to correct this deficiency and ensure optimum nutrition to crop rotation.

Approach: Establishment of response's curves to P on cereals in rainfed cropping. Application of 5 doses of P (soluble form) from 0 to 160 u/Ha at the beginning of a quadrienal rotation (cereals, groundnuts - cereals - groundnuts) and supplementary applications of NKS on each crop.

On mono-cropping rice with 5 doses of P (soluable form) and N each year.

Results: On exondated soils: the P deficiency of KITA and SENO soils has been corrected with application of 80 to 100kg/Ha of P205. Applied at the beginning of the crop rotation, this has a positive effect on the four crops in the rotation.

On inondated and hydromorphic soils at KOGONI, it has not yet been possible to identify substantive effect of successive application of P.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

STATION IRAT DE MOPTI

B.P. 119, Mopti

6.0056, MULTILOCAL EXPERIMENTS WITH FLOATING RICE PLANTS

P. MARTIN, (ML.066.0001)

Objective: To verify the results obtained in the Station to test the selected varieties in their cultivation environment.

Approach: Varietal experiments, re-grouping the best varieties noted on the Station, are planted out in the large cultivation zones, enabling the ultimate selections to be made.

Results: Five varieties varying in length of cycle have been selected for extensive cultivation. Fifteen others are obviously equivalent. The tests are pursued for further knowledge of the adaptation of the varieties to different depths of water between 0.5 m and 2.5 m.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0057, SELECTION OF LATE VARIETIES OF FLOATING RICE AFTER IRRADIATION

P. MARTIN, (ML.066.0002)

OBJECTIVE: The obtaining of very late varieties of Rice (190 - 200 days complete cycle) enabling harvesting in dry conditions.

APPROACH: The two popularized late varieties Khao Gaew and Mali Sawn, of 170 and 180 days respectively, have been irradiated at 35,000 R, duration 35 days in the INRA laboratory, Montpellier, France. The descendants must be followed in genealogical selection. Only the lines that are later than the variety of origin will be kept.

RESULT: The irradiated seeds failed to germinate at the time they were placed under cultivation in July 1972. The technique of irradiation or of cultivation of the "T" planting material, has therefore to be revised.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0058, INVENTORY OF THE INSECTS HARMFUL TO RICE IN MALI AND EVALUATION OF THE LOSSES

P. MARTIN, (ML.066.0003)

OBJECTIVE: To know the various insects parasitic on rice in Mali. To define their relative importance. To study their biology with a view to their control. To evaluate the economic importance of the principal insects.

APPROACH: Systematic surveys are carried out during the period of cultivation. The insects collected are reared in the laboratory to determine their life-cycle and to observe a possible parasitism. The importance of the two principal stem borers (Maliarpha and Chilo) is studied by periodic probing in the field; the losses due to insects are studied by experiments on chemical protection of the crop.

RESULTS: It has been possible to compile a preliminary list of harmful insects occurring in Mali. The biological studies are in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0059, STUDY OF CROSSINGS BETWEEN FLOATING RICE AND ERECT RICE

P. MARTIN, (ML.066.0004)

OBJECTIVE: Improvement of the quality of the grain and of the bearing of the panicle of the floating types of rice.

APPROACH: Six crossings have been affected between the popularized floating varieties of rice (Malobadian, Indochina G, Mali Sawn) and erect varieties of rice having good productivity and satisfactory quality of grain (D52-37, HKG 98, PHAR COM EN). The descendants have been studied by genealogical selection with the objective expressed above.

RESULTS: At the end of the F7 generation of these crossings, two lines have been conserved which satisfy the objectives (erect panicle and improved grain). The selection is being pursued.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0060, COLLECTION OF THE FLOATING VARIETIES OF RICE GLACERRIMS AND SATIVA

P. MARTIN, (ML.066.0005)

OBJECTIVE: Conservation of the local varieties and of introduced varieties. Search for adapted varieties or for varieties for use as parents.

APPROACH: By surveys in the Niger delta and by introductions, a collection of 140 floating glacerrims varieties has been amassed. 270 floating sativa varieties have been introduced from the South-East of Asia and from Pakistan. Varietal experiments enable choice of the most productive varieties. Tests enable study of varieties for the main Selection criteria: resistance to drought, aptitude for floating, tolerance to insects, dormancy to maturity.

RESULTS: Work on introduction of new varieties is being continued. Five varieties of sativa have been selected for their good adaptation to the various local conditions. Search is being made for varieties for new crossings.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0061, STUDY OF DIFFERENT TYPES OF PLOUGHING FOR THE CULTIVATION OF FLOATING RICE

P. MARTIN, (ML.066.0006)

OBJECTIVE: To specify the date and the optimal depth for ploughing. Influence of the frequency of a deep ploughing on the yield from floating rice.

APPROACH: Experiments with statistical arrangement enable comparison of: 2 dates for ploughing - end of cycle or beginning of season; 4 depths for ploughing - 25, 15, 8 cm. and superficial scraping; 3 frequencies for deep ploughing - every 2, 3 or 4 years.

RESULTS: An end-of-season ploughing is superior to that at the beginning of the season - tillage work easier at beginning of season. The experiments are being continued for study of the depth and of the frequency fo deep ploughing.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0062, STUDY OF THE PREPARATION OF THE SEED BED AND OF TEAM-CULTIVATION IMPLEMENTS FOR THE CULTIVATION OF FLOATING RICE

P. MARTIN, (ML.066.0007)

OBJECTIVE: To define the most efficacious method for preparation of the soil. To choose the implements that are best adapted for the preparation of the seed bed and for sowing.

APPROACH: Different implements for tilling are compared - tools with prongs (harrows and canadian cultivators) or rotatory implements (roller for crushing, crosskills). The different conditions for use are compared - work in dry soil or in moist conditions. The efficiency of the implements is examined as much from the technical as from the economic point of view. Various types of sowing machines (drillers) are tested. The influence of the sowing depth on the resistance to drought and the yield of rice is also studied.

RESULTS: The pronged implements are superior for the preparation of the seed bed. Two sowing machines can be advised. The experiments are being continued, with emphasis on the study of the economic aspect (working time on the tasks, amortization costs).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0063, ERADICATION OF PERENNIAL RICE SPECIES WITH RHIZOMES (O. LONGISTAMINATA)

P. MARTIN, (ML.066.0008)

OBJECTIVE: To get back into cultivation, plots totally invaded by wild rhizome rice. Study of the costs of the different treatments.

APPROACH: Eradication: by end-of-cycle ploughing, by chemical treatment at outset of cycle (Dalapon and Diuron), by scything down in plots in fallow. Definition of the modalities for these different treatments and study of the costs.

RESULTS: All the treatments are more or less efficacious; the study of the costs will determine the choice of method. One to two years of experimental work are still needed.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0064, STUDY OF THE DORMANCY OF THE WILD VARIETIES OF RICE, O. BREVILIGULATA AND O. LONGISTAMINATA

P. MARTIN, (ML.066.0009)

OBJECTIVE: To know the biology of these wild rice species and more especially the conditions for their germination.

APPROACH: The making of gradated sowings of wild species of rice for germination must enable determination of the time when they emerge from the dormant state. The germination of seeds sown at different depths is studied in relation to the possibility of the seeds to failing to germinate until after one or more years.

RESULTS: The study undertaken in April 1972 has not yet been made the object of a preliminary scrutiny.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

STATION IRAT DE SOTUBA

B.P. 438, Bamako

6.0065, CREATION OF VARIETIES OF SORGHUM WITH SHORTENED STRAW

L. SOUMARE, (ML.061.0001)

Objective: To shorten the straw of the local varieties with the object of increasing the response to manures and productivity.

Approach: Crossing of the most productive local varieties with foreign dwarf strains and selection in the descendants.

Results: Four crossings have been completed in 1968, four others in 1972. The descendants are being followed up.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0066, CREATION OF SYNTHETIC, HYBRID PENNISETUM MILLET FROM LOCAL VARIETIES

L. SOUMARE, (ML.061.0002)

Objective: Improvement of the local varieties in respect to yield and height of straw.

Approach: Starting from a collection of the best refined varieties, crossings are made between these varieties to obtain topcrosses which will give the synthetic population.

Results: A first synthetic population has been obtained in 1971, a second is foreseen for 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0067, CREATION OF PENNISETUM - MILLET HYBRID WITH SHORT STRAW

L. SOUMARE, (ML.061.0003)

Objective: To shorten the straw of the local varieties with a view to increasing the response to manures, and productivity.

Approach: Crossings of the most productive local varieties with the dwarf, half-Indian Composite, from Senegal (Bambey) and selection in the descendants.

Results: One crossing has been completed in 1972, three are anticipated for 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0068, DETECTION OF MINERAL DEFICIENCIES OF SOILS BY THE METHOD OF POT-CULTIVATION

F. JENNY, (ML.061.0004)

Objective: To determine primary and secondary mineral deficiencies of the soils of the experimental stations (and of the agricultural zones) in vitro, before going on to experimental work in the field (and before recommending a fertilization to be applied).

Approach: The method employed has been widely spread by Professor CHAMINADE. It consists in having grasses (rice, and tropical Gramineae) grown in pots containing the soil to be tested, enriched (or non- treated) with the different major nutrient elements. The absence of one of these elements in the soil leaves its mark on the growth (weight of dry matter in successive samples cut).

Results: Some 50 samples from the surface of different soils of Mali (drained and inundated) have been tested. Certain soils, notably alluvial soils or those on basic rock, present no deficiency; the others present for the most part a primary deficiency in phosphorus, and occasionally a secondary deficiency in sulphur or in potassium.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0069, CREATION OF MAIZE HYBRIDS WITH WHITE SEED AND WITH YELLOW SEED

L. SOUMARE, (ML.061.0005)

Objective: To take advantage of the phenomenon of heterosis for the increase of the yield, while observing the qualities of the seed of the local parent.

Approach: Crossing of the best local variety with four foreign strains. Return crossing to end in 3/4 fixed locals.

Results: The tests on the 3/4 locals are in progress on the stations and substations at Sotuba Katibougou and Kita.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0070, STUDY OF THE EFFECTS OF THE NATURAL PHOSPHATE OF TILEMSI (MALI) ON ANNUAL CROPS

F. JENNY, (ML.061.0006)

Objective: To determine the direct and residual effects of the Tilemsi phosphate upon the different crops of a rotation of dry cultivation: cereals - groundnuts.

Approach: The effects of the Tilemsi phosphate are tested on a rotation of fallow - maize - groundnuts - sorghum - groundnuts at Kita, Sotuba and Sikasso and on a rotation of fallow - millet - groundnuts - millet - groundnuts at Seno. Four rates of application of Tilemsi phosphate are compared (giving 25 percent of P205): 0, 320, 640, 960 kg/ha and a single application of natural Taiba phosphate (37 percent P2O5): 460 kg/ha; these elements are applied either on the fallow, or directly to the crops of the rotation.

Results: Clear responses to the Tilemsi phosphate both in direct effect and in residual effect up to 4 years after application, on the 4 Stations and on the crops tested. The Tilemsi phosphate seems to have a more rapid effect than the Taiba phosphate. Up to the present the optimal Rate of application at the head of rotation seems to be 640 kg/ha of Tilemsi. At Seno, the annual recorded rainfall seems to be an important factor for the solubility and assimilability of this phosphate.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0071, SELECTION OF LINES OF SORGHUM OBTAINED FROM OTHER COUNTRIES HAVING THE SAME ECOLOGY

L. SOUMARE, (ML.061.0007)

Objective: To obtain dwarf and productive lines adapted to the different local conditions, starting from introduced material not yet stabilized.

Approach: Introductions of F2 populations or of F3 lines coming from Senegal and from Upper Volta, followed by genealogical selection.

Results: The crossing 96 (source Upper Volta) has given short lines well adapted to zones in the 600 to 800 metre range of altitude. The original crossings from Senegal have given early lines at present on trial at Kogoni.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

6.0072, MAINTENANCE OF FERTILITY IN CROPPING SYSTEMS

F. JENNY, (ML.061.0008)

Objective: After correcting major soil deficiencies at the beginning of crop establishment, the soil is kept at an optimum of fertility by additional maintenance level of fertilizers to each crop which are calculated on the basic mineral uptake.

Approach: Trials on rainfed quadrienal rotation: cereals, groundnuts, cereals, groundnuts. From the start three levels to correct P deficiency are selected: 40 percent, 60 percent, and 80 percent of what is considered the theoretical maximum productivity of the soil; each crop also receives mineral uptake fertilization calculated on the basis of plant analysis on each treatment.

Results: The first year Maize yields increased proportionally with increasing doses of P.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Bamako, Mali

STATION IRCT DE N'TARLA M'PESOBA

B.P. 28, Koutiala

6.0073, IMPROVEMENT OF VARIETIES OF THE COTTON PLANT FOR DRY CULTIVATION

A. TANGUY, (ML.022.0001)

OBJECTIVE: Improvement and search for new cultivars of Gossypium hirsutum having superior productive and technological characteristics.

APPROACH: Selections made from among the existing material; Crossing between (varieties of) different origins; Search for early varieties to avoid entomological damage; multilocal varietal experimentations.

RESULTS: Propagation of varieties BJA 592, SM 67 and HAR 447-9-26 on more than 80,000 hectares.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0074, MINERAL FERTILIZATION OF THE COTTON PLANT

C. GABOREL, (ML.022.0002)

OBJECTIVE: To provide the producers with formulas for mineral fertilizers, enabling them to improve their yields and to safeguard the fertility of their soils.

APPROACH: Assays of Mineral Deficiencies; Determination and experimental work with formulas. Study of the direct effects and of the residual effect. Study of the deficiencies and of their symptoms by means of soil-less cultivations. Physical and chemical analyses of soils; Foliar diagnosis.

RESULTS: Popularization each year, on upwards of 70,000 hectares, of the NPS (nitrogen, phosphorus, sulphur) formulas determined: N30, P48, S12 at sowing, N 23 at 50 days.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0075, NITROGENOUS MINERAL NUTRITION OF THE COTTON PLANT

F. MAURE, (ML.022.0003)

OBJECTIVE: To determine the rates and optimal periods for application of nitrogenous fertilizers in the vegetative cycle of cotton plants in dry culture.

APPROACH: Fractionated applications in the course of vegetation. Foliar diagnosis. Determination of dates and of rates of application. Experimentation and study of the effects on yields.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0076, STUDY OF THE SYSTEMS OF WORKING OF SOILS

C. GABOREL, (ML.022.0004)

OBJECTIVE: To define the best systems of working of soils while conserving if not improving their fertility and the resources of the rural masses.

APPROACH: Place of the various crops in rotation. Necessary duration of natural or cultivated fallow. Introduction of the cultivation of forage plants. Role of organic manuring and of the re- incorporation of harvest residues. Evolution of soils with different degrees of intensity of working.

RESULTS: Improvement of the yields of food crops (Sorghum, maize, arachis, etc.) entering into rotation with the cotton crop.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0077, UTILIZATION AS A MINERAL FERTILIZER OF THE NATURAL PHOSPHATES OF MALI

C. GABOREL, (ML.022.0005)

OBJECTIVE: To study the possibilities of utilizing the natural Phosphates of Mali in the mineral fertilization of the cotton plant and of the crops entering into rotation with it.

APPROACH: Comparative multilocal experiments with the monocalcium and tricalcium phosphates. Direct action on cotton plants and residual effects on the other crops succeeding them. Research on the optimal rates of application and economic studies on these rates.

RESULTS: Comparable efficacy for the cotton plant of identical P205 unit applications, but economic interest is still very debatable. $

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0078, UTILIZATION OF HERBICIDES IN THE CULTIVATION OF COTTON

F. MAURE, (ML.022.0006)

OBJECTIVE: The practice of chemical weed-destruction by producers of cotton.

APPROACH: Comparative trials of herbicide preparations. Study of their phytotoxic effects on weeds and on cotton plants. Study of the possible residual effect on later crops in succession. Determination of the optimal rates of application, and some spreading procedures.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0079, POPULATION DYNAMICS OF THE INSECT PARASITES OF THE COTTON PLANT IN MALI

G. PIERRARD, (ML.022.0007)

OBJECTIVE: Exact knowledge of the dynamics of the populations of the predators according to the ecological zones of Mali and of the annual climatic conditions; study on the cotton species Gossypium hirsutum and barbadense.

APPROACH: Periodic estimation on untreated growing cotton crops of entomological ravagers throughout the cotton-producing areas of Mali.

RESULTS: Determination of the most useful periods and of the most effective and most economical "doses" for applications of insecticides.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0080, CHEMICAL CONTROL OF THE INSECT PARASITES OF COTTON PLANTS IN MALI

G. PIERRARD, (ML.022.0008)

OBJECTIVE: Research on the most efficacious and most economical formulations for insecticides.

APPROACH: Experiments to compare preparations as to their specificity and their total effect on production. Experiments with dosage, with dates and frequency of applications. Experiments with formulations and mixtures.

RESULTS: Popularization of a standard scheme of treatment with endrin-DDT or with phosalone-DDT on upwards of 60,000 hectares.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0081, ACQUIRED RESISTANCE OF PREDATORS TO INSECTICIDES

G. PIERRARD, (ML.022.0009)

OBJECTIVE: Research on the possible acquisition of a resistance by parasites of the cotton plant to the insecticides recommended for popular use.

APPROACH: Regional investigations of behavior in response to different levels of insecticidal protection. Laboratory study of the sensitivity of the predators to insecticides (topical applications).

RESULT: Suspected resistance of Cosmophila flava.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0082, BIOLOGICAL CONTROL OF INSECT PARASITES OF THE COTTON PLANT

G. PIERRARD, (ML.022.0010)

OBJECTIVE: Research on the possibilites of utilizing entomophages in the control of the predators of the cotton plant.

APPROACH: Comparison of the specificity of attacks by local and by introduced strains of Trichogramma. Rearing of Trichogramma on eggs of Microlepidoptera destructive of food commodities. Research on the most favorable environment for the rearing of the hosts. Determination of the abiotic factors influencing the survival of the parasites.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0083, INSECTICIDE TREATMENT OF COTTON CROPS AFTER WARNING SIGNS

G. PIERRARD, (ML.022.0011)

OBJECTIVE: Possibility of using warning signs to producers for applications of insecticides.

APPROACH: Research on the critical thresholds of harmfulness of the different predators. Research on a methodology to determine the threshold for intervention of insecticidal control.

RESULT: Limited possibility of utilization in rural environments.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0084, IMPROVEMENT OF VARIETIES OF HIBISCUS CANNABINUS

DINHNGOCXUAN, (ML.022.0012)

OBJECTIVE: Improvement of cultivars of Hibiscus cannabinus (Dah) productive and resistant to Anthracnosis.

APPROACH: Tests of artificial inoculation of varieties already known to be partially resistant. Comparative regional varietal investigations.

RESULTS: The obtaining and propagation throughout the whole of Mali of the first selections in the BG-52 varieties.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0085, SELECTION OF SPECIES OF HESSIAN FIBRES OTHER THAN DAH (HIBISCUS CANNABINUS)

DINHNGOCXUAN, (ML.022.0013)

OBJECTIVE: Research within species other than Hibiscus cannabinus to find cultivars best adapted for the production of hessian fibres: Hibiscus sabdariffa, Urena lobata, Corchorus, etc.

APPROACH: Collections and new introductions. Multilocal varietal experimental work.

RESULTS: Propagation in the South of Mali of the varieties Pokeo, THS 22 and THS 30 (Hibiscus sabdariffa) and SB 1 (Urena lobata).

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0086, CULTURAL TECHNIQUES FOR PRODUCTION OF FIBRES FOR SACKING

DINHNGOCXUAN, (ML.022.0014)

OBJECTIVE: Determination of cultural techniques relative to the rural production by handicraftsmen of sacking fibres.

APPROACH: Study of rotations and their variations. Preparation and maintenance of soils; Dates and densities of sowing. Mineral manuring. Utilization of herbicides and insecticides. Optimal time for cutting and harvesting.

RESULTS: Application by the producers (1,000 hectares) of the experimental cultural techniques and those defined by research, and notably: Date for sowing: June; Density: 600,000 plants/hectare (33/5 cms); Mineral manuring; N30, P48, S12 at sowing and N23 at 40 days; Cutting at the outset of flowering.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0087, TECHNOLOGICAL PREPARATION OF NATURAL TEXTILE FIBRES FOR SACKING
DINHNGOCXUAN, (ML.022.0015)

OBJECTIVE: Technological procedures for the treatment and preparation of long fibres destined for sacking.

APPROACH: Techniques for steeping (retting) in retting pits, natural or artificially laid out. Mechanical stripping of the stalks.

RESULTS: Method of steeping in two stages. Establishment of a prototype for a handicraftsman's manual stripping tool.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

6.0088, TECHNIQUES FOR MULTIPLICATION OF THE SEEDS OF HIBISCUS SPECIES
DINHNGOCXUAN, (ML.022.0016)

OBJECTIVE: To define the best techniques to use for an optimal production of seeds of Hibiscus spp.

APPROACH: Experimental work at the seed production centres to specify cultural conditions according to the cultivars multiplied: the best dates for sowing; plantation densities; the mineral fertilizers to apply; the cultural rotations to follow; the herbicides to use, etc.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Mali

MAURITANIA

CENTRE DE RECHERCHES FRUITIERES ET DE LUTTE BIOLOGIQUE IFAC

B.P. 87, Nouakchott

7.0001, PROJECT ON ADAPTED CONTROL MEASURES AGAINST THE INSECT AND ACARID PESTS OF FRUIT CROPS

J.C. TOURNEUR, (MR.051.0001)

Objective: To use combined biological an chemical methods of control in a campaign against the enemies of fruit trees in a Sahara- Sahelian climate.

Approach: Biological control of the scale-insect of the Date-palm Parlatoria blanchardi with indigenous and introduced (Chilocoras bipustulatus variranesis) predators. Study of the life cycle and the population dynamics. Intensive breeding of the predators, modification of entomocenosis, maintenance of a high level of predation. Study of the mites, notably Oligonychus afrasiaticus; utilization of pesticides in a date-palm plantation subjected to biological inspection. Study of the entomological fauna of fruit trees, biology of the mites, research for predators of mites.

Results: Obtained: Successful control of Parlatoria blanchardi. Awaited: Extension of the campaign to the whole of the Mauritanian palm plantation; extension to Niger and to Mali. Knowledge of the harmful fauna of fruit crops, programme of adapted control measures.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Mauritania

CENTRE NATIONAL D'EXPERIMENTATION AGRONOMIQUE ET DE DEVELOPPEMENT

Agricole de Kaedi, B.P., Kaedi

7.0002, WATER REQUIREMENTS OF IRRIGATED CROPS

D.A. RIJKS, (MR.801.0001)

International Network Project - See SG. 801.0009. (11.0010)

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

7.0003, COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH

D.A. RIJKS, (MR.801.0002)

International Network Project - See SG. 801.0007. (11.0008)

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

7.0004, AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN

D.A. RIJKS, (MR.801.0003)

International Network Project - See SG. 801.0008. (11.0009)

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

7.0005, ADAPTION TRIAL ON VEGETABLE CROPS

E. LEFORT, (MR.801.0004)

Objective: Trials on seven species of vegetable: french beans, marrow, cucumber, melon, lettuce, tomatoes, cabbage.

Approach: Trials with spray irrigation, during cold period of the dry season.

Trials with surface irrigation, during dry season.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

PERIMETRE FRUITIER DE RINDIAO IFAC

B.P. 56, Kaedi

7.0006, ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN)

J. KAPLAN, (MR.053.0001)

Objective: Definition of species of fruit crops adapted to the climatic zone, of their performances and of the utilization of the products.

Approach: Complex experimental arrangement to seek to equate: the species and cultivars (subjects - scions - and stocks for grafting if need be), the agronomic techniques, parasitism, the nature of the soils (corrections), moisture feeding according to the water resources, the microclimatic repercussions of agrobiocenosis (oasis effect).

Results: Obtained: Definition of a method of protection for the young plantations at the time of creation of the orchards, and for the production of planting material. Utilization of the banana plant for autoprotection of the banana plantation against aridity and for the protection of associated crops (pineapples, papaws). Awaited: Creation of ecosystems based on date-palm, cashew, citrus trees, mango-trees, guavas, grenadillas, bananas, pineapples, jujube, vine, strawberry, serving as a basis for the definition of agro-industrial unit-types of production.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Mauritania

STATION PHOENICICOLE DE KANKOSSA
IFAC

B.P. Kankossa, par Kiffa

7.0007, DATE-PALM SELECTION. PHYTOTECHNICAL AND ECOLOGICAL RESEARCH WORK

J. KAPLAN, (MR.052.0001)

Objective: Maintenance of oasis - Research for the zones best adapted for cultivation of date palms.

Approach: Study of the Mauritanian and introduced varieties: definition of the requirements in water and fertilization. Utilization of the surface waters and of the ground water. Research for varieties adapted to Sahelian climatic conditions. Research on systems of cultivation associated with date palm plantations, studies of microclimatic modifications brought about by the palm plantation.

Results: Obtained: Data enabling the choice of zones for cultivation of date palms and of the varieties. Phytotechnical results. Awaited: Defnition of stable cropping systems not subject to variations in aridity.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Mauritania

NIGER

INSTITUT DE RECHERCHES AGRON. TROP. ET DES CULTURES VIVRIERES

Agence du Niger, B.P. 150, Niamey

8.0001, CROPPING TECHNIQUES FOR IRRIGATED RICE

J. NABOS, (NG.020.0001)

Objective: To improve the productivity of rice-fields by better cropping techniques.

Approach: Experiments on methods of pricking-out and on direct sowing (sowing in rows with the driller).

Results: Recommendations for popularization.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

LABORATOIRE D'ELEVAGE DE NIAMEY

B.P. 485, Niamey

8.0002, GASTRO-INTESTINAL PARASITISM OF ZEBU CATTLE

R.P. DELAVENAY, (NG.081.0001)

Objective: To determine the nature and the incidence of parasitic infestations.

Approach: Faecal screening and post-mortem examinations in the abbatoirs.

Results: 75 percent of the cattle harbour strongyles (Haemonchus - Cooperia). Trematode infestations are encountered in zebu cattle on pastures along the river banks. The levels of infestation are moderate.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

8.0003, ECONOMY OF REARING THE RED GOAT

J.B. HAUMESSER, (NG.081.0002)

Objective: Permanent supervision of the management of a herd of goats in a village.

Approach: Individual marking of the animals - registration of the births, of those sold, those slaughtered, and of the mortality. Comparison by periodic investigatiions of the composition of the herds in six other villages.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

8.0004, DISEASES OF THE RED GOAT

J.B. HAUMESSER, (NG.081.0003)

Objective: To evaluate the influence of various interventions (treatment of strongylosis, vaccination against rinderpest of small ruminants, and pasteurellosis) on the mortality observed in breeding herds of red goats.

Approach: About 10,000 animals divided into 5 groups of which one is a control.

Results: No significant difference has been recorded to date, in the mortality registered in the different groups.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

8.0005, BACTERIOLOGICAL INQUIRY ON SLAUGHTERED ANIMALS

R. FERRY, (NG.081.0004)

Approach: Judging by the lesions found at meat inspection in animals slaughtered at Niger.

Results: Tuberculosis: bovine animals 1 percent, pigs 2 percent. Rarity of farcy. Demonstraton of melioidosis in pigs - 5 to 10 percent of the animals found to have lesions, according to the annual records.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

8.0006, GASTRO-INTESTINAL PARASITISM IN THE RED GOAT

R.P. DELAVENAY, (NG.081.0005)

Objective: To determine the effect of an anti-parasitic treatment on the weight gain of the animals.

Approach: Three herds chosen, one of which is a control; animals identified individually. Treatment directed against gastro-intestinal strongylosis and coccidiosis. Faecal examination before and after treatment. Individual weight recorded every three months.

Results: No difference has been found to date between the control herd and the treated herds. The effect of malnutrition appears to mask the effect of the antiparasitic treatments.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

8.0007, CULTIVATION OF FORAGE CROPS

B. PEYREDEFABREGUES, (NG.081.0006)

Approach: Experiments with local forage plants in irrigation, particularly Echinochloa colonna.

Results: First results encouraging, the yields being acceptable.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

8.0008, EXPERIMENTS WITH FORAGE SHRUBS

B. PEYREDEFABREGUES, (NG.081.0007)

Approach: Establishing experimental plantation of shrubs on sandy soils in an arid zone (Prosopis juliflora).

Results: Results mediocre on account of failure of Prosopis to adapt itself to such difficult conditions.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

LABORATOIRE DE RADIOAGRONOMIE, SECTION ECONOMIE DE L'EAU IRAT

B.P. 150, Niamey

8.0009, STUDY OF SOIL - MOISTURE - PLANT RELATONSHIPS (WATER ECONOMY)

S. VALET, (NG.021.0001)

Objective: To specify knowledge of the different variable factors in a climatic context to enable the elaboration of hydro-agricultural management projects and the more rational exploitation of perimeter areas already under administration.

Approch: To determine the properties of the irrigated and irragable soils of the Niger embankments (water-soil relationship): 1) speed of infiltration, 2) speed of advance of the humectation front, 3) kinetics of flow of the water, 4) capacity in the field. To determine the useful reserves and easily utilizable reserves (Moisture - Soil - Plants) - humidity to the point of permanent wilthy for several plants. Measurement of the amount of water consumed by the principal food and industrial crops: determinations of the actual and of the maximum water consumption (definition of the ETRM).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

LABORATOIRE ENTOMOLOGIQUE DES RADIOISOTOPES IRAT

B.P. 150, Niamey

8.0010, MARKING INSECT PREDATORS OF FOOD COMMODITIES

ROUGAN, (NG.022.0001)

Objective: To make use of radio-isotopes in order to mark insects which, when set free in nature, may serve to resolve problems concerning their population dynamics, their distribution and their concentration.

Approach: 1) Inventory of insect predators on food commodities (millet - groundnuts - vigna unguiculata); 2) Study radioactive marking of the principal insects concerned (Trogoderma, weevil of vigna and of groundnuts); 2.1 - Study the means of marking; 2.2 - Possibility of passing-on the marker to the descendants. 3) Ecological studies on marked insects.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

SECTION CTFT DU NIGER

B.P. 225, Niamey

8.0011, COMPARATIVE PLANTATION OF DIFFERENT SPECIES OF EUCALYPTUS OF DIFFERENT ORIGINS

J.C. DELWAULLE, (NG.041.0001)

Objective: Comparison of several species of Eucalyptus of different origins.

Approach: Three arrangements: balanced lattice 10-1 for E. ceebra and E. exserta; single tree and balanced lattice 10-2 for the other Eucalyptus.

Results: Some origins of E. camaldulensis are to be studied.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0012, EXPERIMENT WITH EUCALYPTUS CAMALDULENSIS OF DIFFERENT ORIGINS

J.C. DELWAULLE, (NG.041.0003)

Objective: Comparison of different origins of E. camaldulensis.

Approach: Complete blocks.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0013, EXPERIMENT ON MANUAL TILLAGE BEFORE PLANTATION

J.C. DELWAULLE, (NG.041.0004)

Objective: To define the best technique for manual tillage before plantation.

Approach: Five distinct techniques studied in a single-tree experiment on Eucalyptus camaldulensis.

Results: From now on the control is clearly at a disadvantage, it seems to be so even with the techniques established in an arid Mediterranean zone.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0014, EXPERIMENT ON THE SPACING OF EUCALYPTUS

J.C. DELWAULLE, (NG.041.0005)

Objective: To define which is the optimum spacing in the climatic conditions of Sahele.

Approach: Nelder arrangement in circle. Two species: E. camaldulensis and E. tereticornis.

Results: Distinct behaviour of the two species. More lively competition than initially foreseen.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0015, STUDY OF EUCALYPTUS - SOIL RELATIONSHIP

J.C. DELWAULLE, (NG.041.0006)

Objective: To study in the most accurate manner possible the relations between the growth of Eucalyptus and the initial data concerning the ground.

Approach: The most accurate description possible by division of the ground into component squares before plantation.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0016, COMPARISON OF NURSERY TECHNIQUES FOR DALBERGIA AZADIRACTA INDICA AND CASSIA SIAMEA

J.C. DELWAULLE, (NG.041.0007)

Objective: To define the best conditions to be fulfilled in a nursery to obtain a successful plantation of Dalbergia, Azadiracta indica and Cassia siamea.

Approach: Several dates of sowing, two techniques, in pots and in beds - complete blocks.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

NIGER

8.0017, INTRODUCTION OF EUCALYPTUS
J.C. DELWAULLE, (NG.041.0010)

Objective: Introduction of the maximum number of species of Eucalyptus.

Approach: No particular arrangement, the best species to be the object of more complete experiments at a later stage. Introduction of new species each year.

Results: More than 150 species or origins introduced since 1963, certain of them having since been the object of more complete experiments.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0018, NURSERY EXPERIMENT WITH FOREST TREES
J.C. DELWAULLE, (NG.041.0011)

Objective: To know if it is necessary to look after plantations in a nursery or to accustom them to the difficult conditions which wll be their lot.

Approach: 3 soils, 3 types of fertilizer, 3 types of water sprinkling, cubic lattice.

Results: At the end of the first year of plantation, the best results are obtained with the planting materials that have been the best treated in a nursery.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0019, GROWING EUCALYPTUS FROM CUTTINGS
J.C. DELWAULLE, (NG.041.0012)

Objective: Establishment of techniques for cuttings of Eucalyptus.

Approach: Various (substrate, hormones, trimming of the cuttings, misting, lighting, etc.) tending to define the techniques to be employed for success with cuttings.

Results: Maximum lighting, temperature not too high to begin with.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

8.0020, CONTROL OF EROSION OF TROPICAL FERRUGINOUS SOILS
J.C. DELWAULLE, (NG.041.0013)

Objective: Definition of erosion on tropical ferruginous soil and methods of control.

Approach: Five plots of different length, one Wischmeier plot.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

SERVICE DE L'ELEVAGE ET DES INDUSTRIES ANIMALES

B.P. 241, Niamey

8.0021, CONTROL CAMPAIGN AGAINST TSETSE FLIES AND ANIMAL TRYPANOSOMIASES
H. BRUNS, (NG.060.0001)

Objective: To estimate the extent of the danger of trypanosomiases and to know the limits of the affected zones in order to conduct on a small scale, experimental control both against the disease and its vectors.

Approach: Chemical prevention of cattle before transhumance stations. Curative treatment of sick animals. Blood tests for verifying the evolution of the trypanosomiases. Disinfestation of the regions harbouring glossina species, first by terrestrial spraying, next by air craft (helicopter); insecticides based on DDT.

Progress: Important regression of trypanosomiases in treated zones; complete disinfestation of the selected section by air craft; establishment of a barrier of cleaned land between the disinfected section and the others.

SUPPORTED BY Service de l' Elevage des Ind. - Niger

STATION CANNE A SUCRE DE TILLABERY IRAT

B.P., Tillabery

8.0022, EXPERIMENTAL AGRONOMIC WORK ON SUGAR-CANE (CANNA)
A. SANCHEZ, (NG.025.0001)

Objective: Study the possibilities and establishment of techniques for cultivation of Canna with a view to starting a sugar-cane plantation on the perimeter at Tillabery.

Approach: Irrigation: 1) Study the requirements in water; 2) conduction and rationing of water supply in the phases of growth and maturation; 3) establishment of techniques for irrigation ensuring the most efficient use of water (into the furrows or by sprinkling).

Results: Definition of the requirements in water and of the critical periods. Establishment of the technique of irrigation by sprinkling: daily period of sprinkling, definition of the mesh and of sprinklers.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0023, VARIETAL EXPERIMENTS ON SUGAR-CANE
A. SANCHEZ, (NG.025.0002)

Objective: To find industrial varieties for the dry climatic conditions of the Tillabery region, with a high yield of sugar.

Approach: Test the behaviour of the introductions selected in other countries. Establishment of a scale of varieties for the beginning, middle and end of the productiion campaign, allowing the production to extend from November to May.

Results: Proposition of 3 productive varieties: 1) NCO 310 for maturation at the beginning, 2) NCO 376 for maturation at the middle of the campaign, 3) CO 740 for maturation at the end of the campaign.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

STATION EXPERIMENTALE IFAC DE GABOUGOURA

B.P., Gabougoura

8.0024, ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN)
P. SOULEZ, (NG.161.0001)

Objective: - Definition of the fruit tree species adapted to the

climatic zone; their performance and the utilization of the products.

Approach: Complex experimental arrangement to seek to equate the species and cultivars (subjects - scions and stocks for grafting if need be), the agronomic techniques, parasitism, the nature of the soils (corrections), the supply of moisture according to the water resources, the microclimatic repercussions of agrobiocenosis (oasis effect).

Results: - Obtained: renewal of the citrus orchards by the introduction, the multiplication and the distribution of plant material certified as free from the principal known virus diseases and representing the best commercial varieties.

Determine a method for protection of the young plantations at the time of the creation of the orchards, and for the production of planting material.

Awaited: creation of ecosystems based on date palms, cashew, citrus, mango, guava, grenadilla, banana, pineapples, jujube vine, strawberry, serving as a basis for the definition of agro-industrial unit-types for production.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Niamey, Niger

STATION IRAT DE KOLO

B.P. 118, Niamey

8.0025, IMPROVEMENT OF TILLAGE IN IRRIGATED RICE-FIELDS

J. NABOS, (NG.024.0001)

Objective: To improve the productivity of rice-fields by a better working of the soil and by maintenance methods.

Approach: Comparative experiments on different modes of preparing the soil (date - material) and of maintenance methods.

Results: Recommendations to the Popularization services.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0026, FERTILIZATION OF IRRIGATED RICE

J. NABOS, (NG.024.0002)

Objective: To improve the productivity of rice-fields by fertilization.

Approach: Field trials to determine the requirements in the major elements.

Results: Popularization of a nitrogenous fertilizer (65 units/ha in the form of urea).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0027, VARIETAL EXPERIMENTS WITH RICE

G. DEMAY, (NG.024.0003)

Objective: To search for productive varieties of rice of good quality seed for the various existing rice-fields in Niger: 1)traditional rainy- season rice-fields (standing rice and floating rice); 2) irrigated rice-fields carrying a double crop each year.

Approach: Test for adaptation of introduced varieties. Improvement by hybridiation: programme of crossings with a view to improving the quality of the grain of productive introductions (introduced varieties times D.52-37).

Results: Distribution of the D.52-37 variety for cultivation by traditional methods.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

STATION IRAT DE TARNA

B.P. 6, Maradi

8.0028, IMPROVEMENT OF SORGHUMS GROWN ON SAND DUNES

P.L. SAPIN, (NG.023.0001)

Objective: To obtain short-stemmed lines, with large white seeds, adapted to sandy soils.

Approach: Crossings between introduced dwarf sterile-males and local "sand-dune" varieties, with an occasional back-cross on the local, or recombination between different plantings of one and the same hybrid, followed by genealogical selection.

Results: Lines in the process of being tested for productivity.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0029, IMPROVEMENT OF VIGNA UNGUICULATA UNSUSCEPTIBLE TO PHOTOPERIODICITY

P.L. SAPIN, (NG.023.0002)

Objective: Improvement of the productivity and the quality. Research for early varieties resistant to drought, with grouped flowering, and of erect bearing. Qualities of the grain required: large size; colouring, cream.

Approach: Introduction of foreign material via Senegal. Behaviour tests. Selection among descendants of crossings worked out at Bambey.

Results: Selection popularized: 4 - 69 (hybrid progeny 90 days), 88 - 63 equals 70 days (selection in local population). Selections in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0030, IMPROVEMENT OF GROUNDNUTS

P.L. SAPIN, (NG.023.0003)

Objective: Improvement of production and of quality (yield after shelling and oil content). Selection: for precocity and dormancy.

Approach: Introduction of foreign material (via Senegal Bambey) in the absence of local types. Tests of behaviour of descendants of crossings worked out at Bambey.

Results: Distribution of varieties suited to the different ecological zones: Northern zone: 28 - 204, 55 - 437; intermediate zone: 47 - 16; Southern zone: 28 - 206; "virosis" zone: 48 - 37.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0031, IMPROVEMENT OF THE ONION (ALLIUM CEPA)

P.L. SAPIN, (NG.023.0004)

Objective: Improvement of production and quality. Criteria: yield, keeping properties and aptitude for drying.

Approach: Study the local material and collection of ecotypes. Recurrent and genealogical selections.

Results: Varieties popularized: Brown-red (violet) from Galmi; White from Soumarana. Selection in progress: White (Galmi); Synthetic (Maggia).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

NIGER

8.0032, IMPROVEMENT OF THE BOVINE HERD IN ORDER TO OBTAIN WORK OXEN

C. CUIN, (NG.023.0005)

Objective: To obtain work oxen.

Approch: Introduction of bulls of the AZAWACK breed. Inspection of growth.

Results: Establishment of a nourishing food supplement. The obtaining of work oxen having rapid growth, and capable of carrying out intensive work.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0033, IMPROVEMENT OF VALLEY SORGHUMS (WITH OR WITHOUT IRRIGATION)

P.L. SAPIN, (NG.023.0006)

Objective: To obtain short-stemmed lines, having good quality grain, adapted to clayey soils.

Approach: Crossings between introduced dwarf sterile-male and local valley varieties, with an occasional back-cross or recombination between different plantings of one and the same hybrid, followed by genealogical selection. Introduction of foreign varieties answering the same objective.

Results: Popularization of the 137 - 62 variety. Line is being tested for productivity.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0034, THE OBTAINING OF VARIETIES OF MILLET WITH SHORT STRAW

P.L. SAPIN, (NG.023.0007)

Objective: The obtaining of well-adapted dwarf varieties that can be used for intensive cropping.

Approach: Transference of dwarfism D2 by successive back-crosses on three local varieties. Selection for the adaptation starting from dwarf millets originating in Senegal.

Results: None.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0035, IMPROVEMENT OF SOILS BY SUPPRESSION OF DEFICIENCIES

J. CHAROY, (NG.023.0008)

Objective: To determine deficiencies of soils in order to suppress them and thus increase the fertility.

Approach: Response-curve experiments to each fertilizing element. In an experiment, only one element is variable, the other elements being liberally supplied.

Results: Demonstration of a slight deficiency in phosphorus.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0036, MAINTENANCE OF THE FERTILITY OF SOILS WITHIN THE FRAMEWORK OF ROTATIONS

J. CHAROY, (NG.023.0009)

Objectives: After suppression of deficiencies, determination of the maintenance fertilizations which maintain the level of fertility created.

Approach: Experiments comprising different maintenance fertilizers and followed with regard to mobilizations of the elements by the plants and the amounts taken out of the soil by the crops. In the same way the losses of fertilizing elements by drainage are measured.

Results: Propositions for maintenance fertilizer for the ferruginous soils of Niger.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0037, IMPROVEMENT OF THE LOCAL EARLY MILLET

P.L. SAPIN, (NG.023.0010)

Objective: Improvement of the productivity without modification of the varietal type.

Approach: Recurrent selection starting from intervarietal hybrids with S1 tests per se. Test the behaviour on the introductions selected in other countries.

Results: Variety P3 Kolo (mass pedigree selection). Synthetic 1 Zongo (recurrent selection with top-cross test).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0038, TILLAGE

J. CHAROY, (NG.023.0011)

Objective: To evaluate the effects on the evolution of soils and productivity of crops of different forms and possible interventions by team cultivation.

Approach: Study of preparation and maintenance modes: modalities and period of intervention. Estimation of the efforts of traction and the times taken for the tasks. Evolution of the soil and reaction of the plant testing and establishment of material.

Reslts: Determination of the effects of more or less intensive modes of preparation in the framework of the cropping system.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

8.0039, STUDY OF THE NITROGENOUS FERTILIZATION OF CEREALS

J. CHAROY, (NG.023.0012)

Objective: To study the nitrogen-soil-plant relationship with the object of obtaining the best possible return from nitrogenous fertilizers for millet and sorghum.

Approach: Study of the dynamics of nitrogen in the soil: phenomenon of mineralization of the nitrogen undercultivation, possibilites of storing by burial of organic matter, losses by drainage. Experimental work on form-rate- mode of application of the nitrogenous fertilizer, with control by foliar diagnosis.

Results: First results on the phenomena of mineralization of nitrogen in sand-dune soils at Tarna.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Niger

STATION IRCT DE MALBAZA

B.P. 6, Malbaza

8.0040, VARIETAL EXPERIMENTS OF COTTON FOR FLOOD RECESSION CULTIVATION

J. MONTLIBERT, (NG.051.0001)

OBJECTIVE: To compare the agronomic and technical behaviour of different varieties with the prospect of utilizing them in large-scale cultivation.

APPROACH: 8 varietal experiments. 8 or 6 repetitions. Component plot with three rows (varying from 14 to 24 metres) test subjects receiving mineral fertilization and phytosanitary protection.

RESULTS: Propagation of varieties HL1 then 444-2 (in course of completion).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0041, VARIETAL EXPERIMENTS ON COTTON IN IRRIGATED CULTIVATION

J. MONTLIBERT, (NG.051.0002)

OBJECTIVE: To compare the agronomic and technological behaviour of different varieties with the prospect of utilizing them in large-scale culivation.

APPROACH: One varietal experiment - 8 repetitions - component plot with 3 rows 20 metres long - test subjects receiving a nitrogenous fertilizer and phytosanitary protection.

RESULTS: Propagation of varieties HL1 then 444-2.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0042, VARIETAL EXPERIMENTS ON COTTON UNDER POORER CONDITIONS OF CULTIVATION

J. MONTLIBERT, (NG.051.0003)

OBJECTIVE: To compare the agronomic and technological behavior of different varieties wih prospect of utilizing them in large-scale cultivation.

APPROACH: 3 varietal experiments - 8 to 12 repetitions - component plot with three rows or with one row. Test subjects not receiving mineral fertilizer - light phytosanitary protection (2 to 3 treatments).

RESULTS: Propagation of varieties HL1 then 444-2.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0043, STUDY OF MINERAL DEFICIENCIES ON ALLUVIALLY DISTRIBUTED SOILS

J. MONTLIBERT, (NG.051.0004)

OBJECTIVE: To detect mineral deficiencies that will serve as a guide to the fertilizers for popular use.

APPROACH: A withholding experiment (N S P K) - Fisher blocks - component plot with 4 rows.

RESULTS: Characteristic nitrogen deficiency.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0044, STUDY OF MINERAL DEFICIENCIES ON TROPICAL FERRUGINOUS SOILS

J. MONTLIBERT, (NG.051.0005)

OBJECTIVE: To detect the mineral deficiencies which can serve as a guide to the manure for popular use.

APPROACH: A withholding experiment (N S P K) Fisher blocks - component plot with 4 rows.

RESULTS: Significant nitrogen deficiency.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0045, STUDY OF THE PROFITABILITY OF AN APPLICATION OF MINERAL FERTILIZER TO TROPICAL FERRUGINOUS SOILS

J. MONTLIBERT, (NG.051.0006)

OBJECTIVE: To determine the economic interest of a mineral fertilizer applied to a cotton crop.

APPROACH: Comparative experiments with 8 repetitions, comparing a mineral-manured plot with a control not manured.

RESULTS: Masked at times when the recorded rainfall is insufficient. Very noticeable beneficial influence of a N P Bo (nitrogen, phosphorus, boron) fertilizer.

Very clear-cut residual effect on the sorghum crop which follows the cotton.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0046, STUDY OF NITROGENOUS NUTRITION ON ALLUVIALLY DISTRIBUTED SOILS

J. MONTLIBERT, (NG.051.0007)

OBJECTIVE: Since the withholding experiments have revealed a deficiency in nitrogen, to study the best way of applying that nitrogen.

APPROACH: Comparative experiments - rates of application and forms of nitrogen (urea and ammonium nitrate applied at 30, 60 and 90 kg per hectare). Forms of nitrogen, dates for spreading (urea and ammonium nitrate applied at 28, 38 and 59 days) - date for stopping the application of nitrogen (11 kg of nitrogen every 10 days up to the 40th, 60th and 80th days).

RESULTS: Nitrogenous fertilization has only limited and irregular effects; it appears that the manures are not being absorbed. Future experiments will be directed towards a distribution of nitrogen with the plough, some applications of urea to the leaves by spraying, a fallow of leguminous plants.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0047, STUDY THE RESIDUAL ACTION ON SORGHUM OF THE FERTILIZER APPLIED TO COTTON ON TROPICAL FERRUGINOUS SOILS

J. MONTLIBERT, (NG.051.0008)

OBJECTIVE: To determine the residual activity of the mineral fertilizer applied to cotton.

APPROACH: Comparative experiments with sorghum following the withholding experiments with cotton.

RESULTS: The increase in yield of sorghum is very clear-cut in first and second year after the cotton (with application of 50 kg/ha of urea).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0048, HERBICIDE EXPERIMENTS WITH COTTON ON ALLUVIALLY DISTRIBUTED SOILS

J. MONTLIBERT, (NG.051.0009)

OBJECTIVE: To determine the efficacy and the toxicity of various herbicides.

APPROACH: Comparative tests of several herbicides at different rates of application.

RESULTS: Good efficiency on Gramineae but no effect on Cyperus rotundus (principal weed). The tests will be resumed, utilizing arsenical derivatives at the post-emergent stage (after the seeds have appeared).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0049, FOLIAR ANALYSES

J. MONTLIBERT, (NG.051.0010)

OBJECTIVE: To determine whether foliar analyses can enable the detection of deficiencies.

APPROACH: Foliar analyses carried out upon the plants grown in the withholding experiments.

RESULTS: The results obtained confirm those drawn from the field experiments.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0050, EXPERIMENTS ON PHYTOSANITARY TREATMENTS ON COTTON AT THREE LEVELS

J. MONTLIBERT, (NG.051.0011)

OBJECTIVE: After evaluation of the parasitism and establishing the calendar of treatment, to test the efficacy of the standard treatment advised.

NIGER

APPROACH: Comparative experiments enabling comparison of the yield obtained on a plot given standard treatment with those obtained on a plot given intensive treatment and on a non-treated plot.

RESULTS: The efficacy of the standard treatment is considerable and its profitability is always assured. The phytosanitary treatment of crops is an absolute necessity.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

8.0051, TESTING OF PREPARATIONS FOR PHYTOSANITARY PROTECTION ON COTTON
J. MONTLIBERT, (NG.051.0012)

OBJECTIVE: To compare the effect of new preparations to that of the classical mixture.

APPROACH: 2 comparative tests in which the mixture endrin - DDT is made to compete with a new mixture endosulfan - DDT - parathion.

RESULTS: The new mixture has an efficacy comparable with that of the classical mixture.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

NIGERIA

BACITA AGRICULTURAL RESEARCH STATION

Bacita

9.0001, SUGAR CANE NITROGEN FERTILIZER TRIAL

L.B. OSENI, (NI.137.0001)

To determine the effects of different levels of nitrogen fertilizer on three main varieties with a view to determining optimum level of Nitrogen fertilizer for different varieties.

The method is Q - 5 by 3 factorial experiment using five levels of ammonium sulphate (NH4)SO4 on three standard varieties with 1 cwt each of triple super phosphate and murate of potash applied per acre for all plots as blanket application and ammonium sulphate at levels 0 - 448 lbs/acre with 112 lb increment.

Expected to start this year.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0002, SUGAR CANE HERBICIDE TRIAL

L.B. OSENI, (NI.137.0002)

To compare the effects of some available pre-planting or pre-emergence herbicides with Diuron and 2,4-D as standards. The method is a "randomized block design" with six replicate; while Diuron and 2,4-D are included as standards. Expected to start this year.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

BADEGGI RICE RESEARCH STATION

P.M.B., Badeggi via Minna

9.0003, MANAGEMENT PRACTICES OF TWO RECOMMENDED RICE VARIETIES

A. WILLIAMS, (NI.132.0001)

Objective: To assess the effect of nitrogen response of two recommended rice varieties of different growth habits under five management practices and assess the economic returns of the practices.

Approach: A factorial field trial of management practices under two levels of fertilizer rates (recommended) and two varieties.

Progress: The variety Mas 2401 showed nitrogen response up to .5 lb N/acre but dropped at 105 lb N/acre. SML 140/10 showed increasing linear response up to 105 lb N/ac, but its yields were generally lower than that of Mas 2401. The best yield of SML 140/10 was obtained with two handweedings plus insecticide application while that of Mas 2401 was obtained with herbicide (STAM F-34) application without insecticide application.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0004, PRE-PLANTING HERBICIDE TRIAL ON RICE

A. WILLIAMS, (NI.132.0002)

Objective: To assess the weed flora killed by new pre-planting herbicides and to study their phytotoxicity on rice plants.

Approach: A randomized complete block design comparing 13 herbicides and the local farmers' practice.

Progress: Good weed control of grasses, sedges and some broadleaves were obtained with the following herbicides:- Gramevin (Dalapon) at 10 lb Ai/ac applied at 28 days before transplanting; Weedazol at 2 US gal/ac applied at 28 days before transplanting; Planavin at 1 Lb Ai/ac applied at 28 days before transplanting; Gramoxone (Paraquat) at 4 pt/ac applied at 7 days before transplanting. Average yield range from 2500-2900 lb/ac or SML 140/10.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0005, RICE STRAW COMPOST TRIAL

A. WILLIAMS, (NI.132.0003)

Objective: To determine the effect of rice straw compost manure with and without nitrogen fertilizer application on the growth and yield of rice.

Approach: A factorial field trial with three rates of rice straw compost application and with three levels of nitrogen fertilizer application.

Progress: Significant yield increases were obtained with addition of rice compost of 5,000 lbs and 10,000 lbs per acre application.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0006, WATER MANAGEMENT EXPERIMENT IN LOWLAND RICE

A. WILLIAMS, (NI.132.0004)

Objective: To determine the effect of water management practices on the water requirements, growth and grain yield of rice of both early and late season crop and to determine the environmental factors on water use.

Approach: 8 treatments of water levels from 20 cm to continuous soil saturation and water stress on plants arranged in completely randomized design. Water tanks, still wells, calibrated hook gauges used in experiment as well as meteorological instruments.

RESULTS: Appreciable yields of 2.9 t/ha - 5.1 t/ha obtained for paddies subjected to continuous water levels of 5-20 cm. Continuous soil saturation gave yield of 2.2 t/ha for two varieties, OS6 and SML 140/10 respectively. Reduction in yield of over 75 per-

cent was obtained with moisture stress. Evapotranspiration values range from 646 - 2,287 mm.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0007, NURSERY TECHNIQUES TRIAL FOR RICE
A. WILLIAMS, (NI.132.0005)

OBJECTIVE: To compare some nursery techniques with direct seeding of rice and their effects on the plant growth and grain yield.

APPROACH: Five treatments compared with two rice varieties, IR8 and SML 140/10. Treatments include transplanting of 12 ("Dapog method"), 21, 28, 35 old seedlings compared with pregerminated seed broadcast.

RESULTS: With IR8, no significant differences in yield obtained in the methods used, but for 5ML 140/10 low yields were obtained with pregerminated broadcast seeds and the "Dapog" method. It is advisable to transplant SML 140/10 with 28 old seedlings.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0008, POST-PLANTING HERBICIDE TRIAL FOR RICE
A. WILLIAMS, (NI.132.0006)

Objective: To determine the effectiveness of post-planting applications of various herbicides on swamp rice and assess the weed flora killed.

Approach: A randomised complete block design replicated thrice with 20 treatments.

Results: 2 handweedings at 21 and 40 days after transplanting emerged best, but not better than preforan of 4/kg/HA of A.I. or the emulsifiable conc. at 5 pt/acre or 7 pt/acre. Yields obtained ranged from 3.099 lb/acre to 3318 lb/acre for these good treatments. Other good chemicals include treplan (Tripluralin) and Molinate.

Chemical applied at 14 days after transplanting.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0009, RICE CROP LOSS - DISEASE INTENSITY CORRELATION EXPERIMENT
V.A. AWODERU, (NI.132.0007)

To determine the loss in yield of swamp rice due to field infection by the blast disease of rice.

This was done by comparing the blast disease incidence and grain yield of plots treated with proprietary fungicides with untreated control plots. A graph of blast disease incidence against loss in grain yield was plotted and the correlation coefficient determined.

A range of 3.7 - 39.2 percent increase in yield over the control was obtained when the grain yield of the plants of D99 and Bg 79 treated with fungicides were compared with the untreated plants. Rice blast disease incidence and the percent increase in grain yield over the control were negatively correlated (lambda equals negative 0.949) in BG 79. The regression analysis showed that for a unit increase in the rice blast disease incidence, the yield decreases by a significant value of 16.3 percent in the same variety.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0010, FUNGICIDAL CONTROL OF THE RICE BLAST DISEASE
V.A. AWODERU, (NI.132.0008)

To determine effective fungicides in controlling the blast disease of rice in the field and in the nursery.

Nursery and field spraying trials. Disease incidence determined 35 days after planting in the nursery and at panicle initiation in the field in randomised block designs.

Two fungicides were found to be effective in controlling the blast disease of rice. These are Blastcidin - S applied at 1 gm/litre and Dithane M-45 at 2 gm/litre.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0011, NITROGEN FERTILIZATION IN FLOODED FIELDS - METHODS AND TIMING OF NITROGEN APPLICATION
K.A. AYOTADE, (NI.132.0009)

Objective: (1) To compare different methods of deep placement of N with broadcasting using yield, N uptake and recovery data as indices of efficiency. (2) To find the best time of N top-dressing on three varieties of different growth duration using yield, yield component, N uptake and recovery and grain productive efficiency data as indices of efficiency.

Approach: Experiments were conducted separately. All plots received a basal dressing of 37 kg/ha P as single superphosphate. No K fertilizer was applied. Na2 ammonium sulphate was applied in one exception in 2 equal doses. First dose, 37 kg/ha N was applied two weeks after transplating as follows: (a) surface broadcast (b) shallow placement by Japanese rotary hoe; (c) deep placement by native stumping hoe; (d) deep placement by modified farmers' technique; (e) deep placement by mudballs; (f) control (no N). The second half was top dressed at panicle initiation. N (2/3) was applied in the second experiment at the following times - 42, 54, 70, 84, 96, 112 days from seeding. In both experiments a split-plot design was used with varieties (IR8, SML and MAS 2401) as the main plots and methods or times of N application as sub-plots, with 3 replications. 28 day-old seedlings were transplanted. Grain and straw samples were analysed for N. Soil samples were analysed and available - N. Ten hills were collected in the timing experiment for yield component analysis.

Progress: Completed.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0012, FERTILITY STATUS OF MAJOR SOIL OF NIGERIA GROWN TO RICE
K.A. AYOTADE, (NI.132.0010)

Objective: (1) To characterize major soils of Nigeria, used for growing rice with a view of determining their fertility status and their production capability. (2) To arrive at recommendations for improved management for rice production on these soils.

Approach: The program of research will include field study of soils in major rice growing areas, giving full cognizance to work already achieved in this field. Initially, field studies would be limited to a few carefully selected regions of the country, where major rice producing areas exist. Selected soils in these areas are to be carefully described and sampled for complete laboratory analyses. In a number of cases, bulk samples will be taken for greenhouse studies. Based on the outcome of the above mentoned studies, maximum yield trials would be set up in agro-ecologically representative locations. Correlation studies between soil morphology and nutrient status characteristics and productivity will be carried out in order to arrive at recommendations for improved soil and plant management.

Progress: The project is just to commence.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0013, TO SURVEY FIELD PESTS OF RICE IN NIGERIA
E.A. AKINSOLA, (NI.132.0011)

To survey field pests of rice in different ecological areas in Nigeria.

About 13 Lepidopterous and two Dipterous stem boring larvae have been collected from rice stems. Several leaf hopper species and blister beetles are also important rice pests at certain periods of plant growth.

Detailed information on the abundance and relative importance of the different species at different localities in Nigeria is being obtained.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0014, TO STUDY THE BIOLOGY AND ECOLOGY OF DIFFERENT SPECIES OF RICE STEM BORERS
E.A. AKINSOLA, (NI.132.0012)

Five species of rice stem borers are of major significance in Nigeria. Field and laboratory observations are carried out to study the biology and ecology of the different species.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0015, TO CONTROL FIELD PESTS OF RICE - (I) EVALUATION OF DIFFERENT INSECTICIDES
E.A. AKINSOLA, (NI.132.0013)

Field trials are conducted to evaluate different insecticides for the control of stem borers of rice.

The feasibility of using natural enemies in an integrated approach for the control of rice pests is being studied. To this end, survey of natural enemies of the pests in all ecological areas in Nigeria is carried out

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0016, VARIETAL RESISTANCE OF RICE TO THE MAJOR PESTS
E.A. AKINSOLA, (NI.132.0014)

Several varieties are screened both in the field and in the greenhouse to evaluate their resistance to the major pests of rice.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

BUGUMA RESEARCH STATION
Buguma

9.0017, SHRIMP CULTURE
G. IGONIFAGHA, (NI.193.0001)

Objective: The objective is to increase shrimp production in lagoon brackish waters.

SUPPORTED BY Federal Dept. of Fisheries - Nigeria

9.0018, SELECTION OF FISH SPECIES FOR CULTURE IN BRACKISH WATER
G. IGONIFAGHA, (NI.193.0002)

Objective: Identification of local fish species suitable for brackish water culture.

SUPPORTED BY Federal Dept. of Fisheries - Nigeria

DEPARTMENT OF VETERINARY SCIENCE
Nsukka, East Central State

9.0019, CONTROL OF PNEUMONIA-ENTERITIS COMPLEX IN GOATS BY USE OF "PEC" TISSUE VACCINE
O. NDUAKA, (NI.462.0001)

Objective: To control Pneumonia-Enteritis Complex disease which is the most deadly disease of goats in the Eastern States of Nigeria by use of a "PEC" tissue vaccine developed by the abovenamed workers.

Approach: The vaccine is prepared by inoculating apparently healthy young goats with virulent blood taken at the height of temperature from a goat suffering from Pneumonia-Enteritis Complex. The inoculated goat is killed at height of temperature of 105 degrees F or above. The spleen and lymphoid glands are then removed for preparation of the vaccine. The vaccine is then inoculated subcutaneously after refrigeration for five days. Chloroform is used as agent for inactivating the virus.

Progress: A group of goats immunized by this method appeared to have developed solid immunity against the disease. They have been challenged periodically by use of virulent blood and by natural and direct contact with infected goats. The oldest batch has carried the immunity for six months now.

SUPPORTED BY University of Nigeria - Nsukka

FACULTY OF AGRICULTURE OF THE UNIVERSITY OF IFE
Ile - Ife

9.0020, THE NUTRITIVE VALUE OF NIGERIAN FORAGES
A.A. ADEMOSUN, (NI.360.0001)

Objective: To study the digestibility of Nigerian forage grasses in sheep and goats in relation to the chemical composition of the forage.

Approach: Stylosanthes graciles harvested at four stages of maturity was ground, mixed with ground corn plus cob and fed to goats and sheep; chemical components of the feeds were determined.

Progress: Digestibility of cellulose, acid-detergent fiber, crude fiber, ligrium and cell wall constituents decreased with advancing maturity. Goats digested the various components more extensively than sheep, but sheep had a higher level of feed intake. Maintenance requirements in terms of TDN was estimated at 1.4 kg. per 100 kg. of live weight for goats and 1.9 for sheep. Similar studies are in progress for elephant grass (Pennisetum purpuseum).

SUPPORTED BY University of Ife - Nigeria

9.0021, THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF THE LAYING HEN
A.A. ADEMOSUN, (NI.360.0002)

Objective - To investigate the levels of calcium and phosphorus required to sustain high egg production of good shell quality.

Approach - Four levels of Ca and two levels of P were fed to layer birds in battery cages and deep titler in a 4 x 2 factorial design. Feeding period will be one year. Assessment criteria are to

include egg shell quality measured by weight per area, egg production, percent tibia ash, live weight of bird and Ca and pretention by birds in battery cages.

Progress - Shell weight per unit area appears to be a satisfactory method for estimating egg shell thickness. Surface area (S) can be estimated from egg weight (W, grams) by the formula: S not equal to 4.67 W2/3. The feeding experiment is continuing.

SUPPORTED BY University of Ife - Nigeria

9.0022, GENETIC VALUE OF LOCAL CHICKENS AS MATERIAL FOR IMPROVEMENT OF POULTRY PRODUCTION

J.O. AKINOKUN, (NI.360.0003)

Objective - To evaluate local breeds of chickens for breeding stock potential in improving poultry production.

Approach - Data on hatching weight, rate of growth, feed intake, egg production, and fertility of local chickens under modern management methods is being collected and evaluated. Selected individuals will be used to carryout crosses with other local and exotic breeds.

Progress - Initial observations indicate that weights of local chickens in the early stages of growth were similar to those of a light breed of exotic chickens reared under the same conditions.

SUPPORTED BY University of Ife - Nigeria

9.0023, NUTRITIVE VALUE OF OPAQUE-2 MAIZE FOR THE CHICK AND RAT IN THE TROPICS

A.A. ADEMOSUN, (NI.360.0004)

Objective - To compare the amino acid composition and nutritional value of opaque-2 maize with that of local maize.

Approach - The amino acid composition of guinea corn, local yellow maize (NS.2) and opaque-2 maize were compared. Rations containing 90% NS2 maize, opaque-2 maize, guinea corn or NS1 maize supplemented with 0.25% lysine were fed to chickens and white rats for 28 days.

Progress - Feed gain ratio and protein efficiency ratio were improved when opaque-2 maize replaced NS2 maize in the rations. Lysine supplemented the protein efficiency ratio for rats and chicks, but not to the extent produced by opaque-2 maize.

SUPPORTED BY University of Ife - Nigeria

9.0024, USE OF RADIATION FOR THE IMPROVEMENT OF FUNGAL STRAINS AS THE NUTRITIONAL ADDITIVE IN THE CARBOHYDRATE RICH ROOT CROPS OF NIGERIA

E. BALOGH, (NI.360.0005)

Objective - To select fungi with extended mycelial growth and delayed sporulation useful in increasing the protein content of cassava starch paste.

Approach - A selected strain of Rhizopus oligisporus was grown on shaken cultures of cassava starch medium obtained from locally grown tubers. After sporulation, the spores were suspended in mineral solution and irradiated with gamma radiation of 18 to 55 krad intensity. The irradiated material was inoculated on Czapek - Do4 and malt agar media.

Progres - Several mutants were obtained, one of which had delayed sporulation characteristics, both on artificial media and cassava paste extrudates.

SUPPORTED BY University of Ife - Nigeria

9.0025, MICROORGANISMS IN THE RUMEN AND THEIR ROLE IN NUTRITION

A.A. ADEGBOLA; (NI.360.0006)

Objective - To isolate and characterize rumen microorganisms with respect to their role in the nutrition of ruminants.

Approach - Facultative and strictly anaerobic microorganisms in the rumen of goats and cattle have been isolated and cultivated for further studies. Of particular interest will be the cellulolytic bacteria, whose physiology will be studied.

Progress - The total count of viable rumen bacteria have been determined by two different methods. Counts range from 3.5 to 8.1 x 10 to the 8th power/ml for goats and 5.4 to 7.2 x 10 to the 8th power/ml for cattle.

SUPPORTED BY University of Ife - Nigeria

9.0026, THE SOIL-PLANT SYSTEM IN RELATION TO THE INORGANIC NUTRITION OF HERBAGE GRASSES IN NIGERIA GRASS-LAND ASSOCIATIONS

A.A. ADEGBOLA, (NI.360.0007)

Objective - To study rooting habits of selected grass species, movement of ions in the root environment and nutrient requirement of the selected grasses.

Approach - Labelled N and P were applied at different depths in the root zone of Northern Gamba grass. Uptake of each element was measured.

Progress - Increase in dry matter yield was due mainly to N. greatest absorption of P32 came from the 7.5 cm depth of application. Recovery of added P was very low.

SUPPORTED BY University of Ife - Nigeria

9.0027, EFFECTS OF MANAGEMENT AND ENVIRONMENT ON GROWTH AND LAYING ABILITY OF IMPORTED COMMERCIAL STRAINS OF CHICKENS

J.O. AKINOKUN, (NI.360.0008)

Objective - To measure rate of growth and egg production of imported commercial chickens under modern management conditions.

Approach - Weight gains and egg production of two breeds of chickens in battery cages and on deep litter are being studied. Changes in performance with time will be evaluated.

Progress - Large variations among individuals of both breeds were observed. Egg production was significantly higher for both breeds in cages than on deep litter.

SUPPORTED BY University of Ife - Nigeria

9.0028, CHANGES IN THE MINERAL CONTENT OF SOIL AND FEED AS RELATED TO THE BLOCK COMPOSITION OF FARM ANIMALS

A.O. AYENI, (NI.360.0009)

Objective - To identify the nature of existing problems of mineral deficiencies and excesses and to forecast problems that could arise as a result of intensified breeding.

Approach - Blood samples of cattle from 7 farms in the Western State of Nigeria have been taken for analysis. Sampling and analysis of forage, grain and soil from the same farms will follow.

Progress - Blood samples are being analyzed and soil and plant sampling will soon begin.

SUPPORTED BY University of Ife - Nigeria

9.0029, DISEASE RESISTANCE OF LOCAL CHICKENS
J.O. AKINOKUN, (NI.360.0010)

Objective: To study the resistance of local chickens to common disease and to compare mortality rates of exotic and local breeds exposed to coccidial infections and lencoria.

Approach: Two breeds of chicken - one exotic and the other local Nigerian - will be bred in single sire pens. Day-old chicks will be housed in wire cages off the floor. Both groups will be infected with coccidial organisms, and a record of mortalities will be kept.

Progress: Suitable breeding stock are being located for the project.

SUPPORTED BY University of Ife - Nigeria

9.0030, THE USE OF DISCARDED COCOA BEAN MEAL IN LIVESTOCK FEEDING
A. ABAELU, (NI.360.0011)

Objective: To investigate methods of treating waste cocoa bean meal to reduce the theobromine content to tolerable levels for livestock without unduly altering the protein composition.

Approach: Various methods of treating discarded cocoa bean meal include hot water extraction, dilute alkali treatment and boiling in water. Economics of promising procedures will be studied, and changes in the chemical composition of the product will be followed. Feeding trials using swine will be used to evaluate the nutritive value and digestibility of the product.

Progress: Preliminary results indicate that hot water extraction can reduce the theobromine content of cocoa bean meal to tolerable levels for swine. Changes in protein content are being investigated.

SUPPORTED BY University of Ife - Nigeria

9.0031, EVALUATION OF CROP RESIDUES, INDUSTRIAL WASTE PRODUCTS AND SILAGE ON THE PERFORMANCE OF BEEF CATTLE
S.A. ADEYANJU, (NI.360.0012)

Objective: To determine the effect of various feed supplements and silage on the performance of beef cattle.

Approach: Feed lot trials using the Mdama breed of beef cattle will be used to study the performance of these animals when fed different levels of brewers, waste, rice bran, molasses and silage.

Progress: Data on availability of industrial wastes are being collected and samples are being analysed in the laboratory.

SUPPORTED BY University of Ife - Nigeria

9.0032, THE PRODUCTIVE POTENTIAL OF LOCAL BREEDS OF PIGS IN THE WESTERN STATE OF NIGERIA
J.O. ILORI, (NI.360.0013)

Objective: To compare nutrient requirements of local breeds of pigs in comparison with exotic breeds and to cross breed local pigs with exotics to improve desirable characteristics.

Approach: Records of performance of local pigs under modern management methods will be kept. Animals with promising characteristics will be used as breeding stock to upgrade local swine and for cross breeding with exotic breeds.

Progress: Local pigs are being procured.

SUPPORTED BY University of Ife - Nigeria

9.0033, THE USE OF INDUSTRIAL BY-PRODUCTS IN SHEEP AND GOAT RATIONS
A.A. ADEMOSUN, (NI.360.0014)

Objective: To investigate the potential of rice bran, molasses and brewers' waste as supplemental feeds for sheep and goats.

Approach: Rice bran molasses and brewers' waste will be fed in different amounts to sheep and goats in replacement of grain feeds. The performance of the animals will be evaluated.

Progress: Materials are being collected and analyzed in the laboratory.

SUPPORTED BY University of Ife - Nigeria

9.0034, STUDY OF MARKET STRUCTURE AND ORGANIZATION WITH SPECIAL REFERENCE TO THE BUYING ARRANGEMENTS OF FOOD CONTRACTORS FOR INSTITUTIONS
C.O. ILORI, (NI.360.0015)

Objective: To study the extent to which large purchases of foodstuffs, particularly of institutional buyers, have affected the structure of markets for farm food products.

Approach: Use of questionnaires to survey institutions and food contractors.

Progress: A preliminary survey of institutions has been conducted with a view to selecting samples of food contractors and institutions for interview.

SUPPORTED BY University of Ife - Nigeria

9.0035, THE IMMIGRANT FARMERS OF YORUBALAND - A STUDY IN FOREST-SAVAANA RELATIONSHIPS
C.O. ILORI, (NI.360.0016)

Objective: To study the varied economic opportunities, including the introduction of new crops like cocoa, which have accelerated the pace of migration from the savanna to the forest area of the Southwestern part of Nigeria.

Approach: Interviews of 1500 to 2000 migrant farmers.

Progress: A preliminary survey of the southern forest area has been conducted with a view to locating settlements which have migrant farmers in significant numbers. The settlements so identified have been mapped and have been used as a basis for the population from which a sample of 56 settlements have been drawn.

SUPPORTED BY University of Ife - Nigeria

9.0036, MEASUREMENT OF REAL WAGES AND INCOMES IN WESTERN STATE AGRICULTURE
J.N. ABAELU, (NI.360.0017)

Objective: To measure labour productivity under different farming systems, identify the mode of payment of wages quantitatively, determine the relationship between labor productivity and real wages and to determine the capacity of different farming systems to meet politically acceptable minimum wage rates.

Approach: Field survey of four study villages.

SUPPORTED BY University of Ife - Nigeria

9.0037, AGRICULTURAL CREDIT THROUGH COOPERATIVES IN WESTERN NIGERIA
C.A. OSUNTOGUN, (NI.360.0018)

Objective: To evaluate the present system of credit administration in rural cooperatives, study investment of funds and analyze the factors influencing membership support in rural credit societies.

Approach: Field interviews.

SUPPORTED BY University of Ife - Nigeria

9.0038, IMPROVEMENT OF PEPPERS (PIPER NIGRUM)

J.D. FRANCKOWIAK, (NI.360.0019)

Objective: To develop sweet and hot varieties of pepper with good fruit size, some resistance to virus and good yield.

Approach: Selection in the field and breeding.

Progress: Preliminary screening for virus reaction indicates that all introduced varieties are susceptible to the pepper viruses found in Nigeria. Local varieties appeared to be resistant to at least one virus. Many breeding lines have not stabilized for hot taste character.

SUPPORTED BY University of Ife - Nigeria

9.0039, INHERITANCE STUDIES IN COWPEA (VIGNA VINGUICULATA)

J.D. FRANCKOWIAK, (NI.360.0020)

Objective: To study the inheritance patterns of cowpea which affect disease reactions, seed and pod characteristics and agronomic traits as a preliminary step in a cowpea improvement program.

Approach: Observation of characteristics in greenhouse and field. Isolation of characteristics and by selective breeding.

Progress: Three genes affecting seed coat color pattern were found to be inherited as monogenic recessives. Two genes which produce black, tan or red seed coat colors are inherited as monogenic dominants. A monogenic recessive which causes dilution of the anthocyanin pigment of seeds, flowers and stems and modifies expression of the Holatein and Watson genes was observed in material desired from a local cowpea variety. At least four genes which produce resistance to anthracnose have been isolated.

SUPPORTED BY University of Ife - Nigeria

9.0040, EFFECTS OF TIME OF APPLICATION OF NITROGEN ON YIELD & OTHER GROWTH CHARACTERISTICS OF UPLAND RICE & RESPONSE OF UPLAND RICE TO PHOSPHORUS

B.E. ONOCHIE, (NI.360.0021)

Objective: To determine the response of three varieties of upland rice to timing of nitrogen application and to applications of phosphorus.

Approach: Nitrogen was applied two weeks after germination, late tillering and booting stages.

Progress: Two varieties produced the highest grain yields, panicle weight and panicle to straw ratio when nitrogen was applied at the booting stage. The third variety attained highest levels or applications made at late tillering. No response to phosphorus was obtained; there was a highly significant variety x time interaction.

SUPPORTED BY University of Ife - Nigeria

9.0041, THE INFLUENCE OF PLANTING DATE AND FERTILITY LEVEL ON THE PRODUCTION OF SEED YAMS FROM CUT SETTS

B.E. ONOCHIE, (NI.360.0022)

Objective: To determine the optimum time of planting yam setts to obtain seed yams for the next cropping season and to determine the effect of fertilizer on the growth of yams emerging from yam setts of different sizes.

Approach: A factorial experiment employing three planting dates, two sett sizes and two rates of fertilizer.

Progress: There was a significant sett size x fertilizer interaction, but the interaction between planting date and fertilizer was not significant.

SUPPORTED BY University of Ife - Nigeria

9.0042, YAM STORAGE TRIAL

B.E. ONOCHIE, (NI.360.0023)

Objective: To determine the influence of varying levels of N, P, K and micronutrients applied as fertilizers to yam on their storage quality.

Approach: Losses through soft rot were measured after six months of storage.

Progress: Without fertilizer, there was a 48% loss due to soft rot during six months of storage. Nitrogen applications increased soft rot; P, K and micronutrients had little effect.

SUPPORTED BY University of Ife - Nigeria

9.0043, SOME PHYSIOLOGICAL ASPECTS OF YAM PRODUCTION

I.C. ONWUEME, (NI.360.0024)

Objective: To study the physiological aspects of yam yields with a view to devising better cultural practices to improve the farmers' production.

Progress: Yam sprouting is earlier and more vigorous for setts taken from the head than for setts from other parts of the tuber. The yam sprout appears to originate and differentiate from a deep-seated meristematic region.

SUPPORTED BY University of Ife - Nigeria

9.0044, POPULATION DYNAMICS OF PLANT PARASITIC NEMATODES IN CULTIVATED SOIL

J.O. AMOSU, (NI.360.0025)

Objective: To determine the kinds and numbers of plant parasitic nematodes in established eight-year crop rotations.

Progress: Laboratory equipment is being assembled for identification of nematodes.

SUPPORTED BY University of Ife - Nigeria

9.0045, INVESTIGATION AND IMPROVEMENT OF NIGERIAN SEED MELON PRODUCTION

I.C. ONWUEME, (NI.360.0026)

Objective: To determine the yield potential of Nigerian seed melons and to develop optimum agronomic practices.

Approach: Study optimum time of planting, spacing, fertilizer requirements and methods of application. Pollination and seed setting characteristics will be investigated.

SUPPORTED BY University of Ife - Nigeria

9.0046, SOCIO-AGRO-ECONOMIC SURVEY OF SOME SELECTED VILLAGES IN IFE DIVISION

H.A. OLUWASANMI, (NI.360.0027)

Objective: To examine agricultural patterns, land use, land tenure and health needs of selected villages in Ife division and then plan a rural development program for selected areas.

Approach: Interviews with 300 persons in 9 villages.

Progress: Data collection has been completed and the results are being processed. Technical assistance programs will follow.

SUPPORTED BY University of Ife - Nigeria

9.0047, DEVELOPMENT OF A LOW COST INCUBATOR FOR LOCAL USE

J.B. ADEYERI, (NI.360.0028)

Objective: To develop a low cost incubator for local use and to find the heating method and type of construction best suited to use in rural areas.

SUPPORTED BY University of Ife - Nigeria

9.0048, SOIL CHEMICAL AND PHYSICAL CHANGES UNDER CONTINUOUS CULTIVATION

E.E. SCHULTE, (NI.360.0029)

Objective: To investigate whether high crop yields can be maintained with generous application of fertilizer under continuous cropping and to study changes in the physical and chemical properties of the soil with time.

Approach: Maize, yams and cassava are planted in rotation in a N (3 levels) x P (3 levels) x K (3 levels) x M (2 levels) factorial experiment, where M is a mixture of Mg, sand micronutrients. Yields, soil nutrient states, soil bulk density, moisture capacity and water infiltration rate are measured at each harvest.

Progress: After four years of cropping, yields are increasing slightly, but water infiltration rate has decreased appreciably.

SUPPORTED BY University of Ife - Nigeria

9.0049, EVALUATION OF NITROGEN FERTILIZERS

A.O. OBI, (NI.360.0030)

Objective: To evaluate the effect of different nitrogen carriers on soil acidification and crop yield.

Approach: Urea, ammonium sulphate and nitrochalk are applied at different rates to field plots. Yields, nutrient removal and soil pH are measured at each harvest.

Progress: Urea depressed soil pH half as much as ammonium sulphate. No significant changes in pH occurred with nitrochalks.

SUPPORTED BY University of Ife - Nigeria

9.0050, RIVER OBUBA-OPA WATERSHED PROJECT - RUN OFF AND EROSION STUDIES

G.E. WILKINSON, (NI.360.0031)

Objective: To evaluate the effects of modern methods of cultivation on soil degradation and erosion.

Approach: Use artificial watersheds with both natural and artificial ground cover. Measure rainfall, runoff and erosional losses.

Progress: Raindrop impact is the principal force involved in soil erosion. When this force was absent, running water caused very little soil loss.

SUPPORTED BY University of Ife - Nigeria

9.0051, THE SULPHUR AND ZINC STATUS OF SOILS OF THE WESTERN STATE OF NIGERIA

E.E. SCHULTE, (NI.360.0032)

Objective: To determine the extent of sulphur and zinc deficiency in soils of the Western State of Nigeria and to relate these deficiencies to soil properties.

Approach: Maize was grown in 106 soil samples collected at random from the Western State. Response to added Zn and S was measured in the greenhouse. Uptake of Zn and S will be correlated with soil tests, organic matter, pH and clay content, using multiple regression analysis.

Progress: Under greenhouse conditions, 90% of the soil samples were found to be deficient in S, indicating a widespread deficiency possible in the field.

SUPPORTED BY University of Ife - Nigeria

9.0052, DESIGN AND DEVELOPMENT OF A TRACTOR AND RELATED IMPLEMENTS FOR LOCAL MANUFACTURE

G.A. MAKANJUOLA, (NI.360.0033)

Objective: To design and construct a 15 horsepower, four wheel tractor and some matching field and processing equipment suitable for local manufacture.

To modify some existing field and processing equipment to match the tractor.

Progress: Application has been made for patent rights for a chain differential unit for the tractor and the equipment is under construction.

SUPPORTED BY University of Ife - Nigeria

9.0053, THE USE OF MASS MEDIA AS A MEANS OF COMMUNICATION BY EXTENSION WORKERS WITH THE FARMERS OF THE WESTERN STATE OF NIGERIA

J.A. EFIONAYI, (NI.360.0034)

Objective: To determine the channels of communication by which farmers receive information on cropping programmes and the impact of mass media on recommended farming practices.

Approach: Field interviews.

SUPPORTED BY University of Ife - Nigeria

9.0054, THE DESIGN, TESTING AND DEVELOPMENT OF A MACHINE FOR SHELLING MELON SEEDS AND EXTRACTING MELON SEED OIL

G.A. MAKANJUOLA, (NI.360.0035)

Objective: To develop mechanical devices for shelling melon seeds and expressing the seed oil.

Approach: The characteristics of melon seeds have been studied and construction of a prototype sheller has begun.

SUPPORTED BY University of Ife - Nigeria

9.0055, GENESIS OF SOME REPRESENTATIVE SOILS OF THE DESIRED SAVANNA REGION

A.G. OJANUGA, (NI.360.0036)

Objective: To study the pedogenic processes differentiating soils in this region and compare the processes with those operating in the forest region.

Approach: Physical, chemical and petrographic analysis of soil profiles.

SUPPORTED BY University of Ife - Nigeria

9.0056, INVESTIGATION OF THE INFLUENCE OF CLIMATE ON SOIL MORPHOLOGY AND SOIL DISTRIBUTION IN THE METAMORPHIC REGIONS OF NIGERIA

A.G. OJANUGA, (NI.360.0037)

Objective: To study effect of climate as a soil forming factor on soil morphology and soil distribution in Western Nigeria.

Approach: Analysis of soil profiles from different climatic zones.

SUPPORTED BY University of Ife - Nigeria

NIGERIA

FEDERAL INSTITUTE OF INDUSTRIAL RESEARCH

P.M.B. 1023, Ikeja Airport

9.0057, MALT PRODUCTION FROM LOCAL GRAINS

J.A. DINA, (NI.550.0001)

Objective: Imports of malt amount to millions of pounds annually. Success in this product would result in considerable savings.

Approach: Local cereals namely sorghum, millet and experimentally grown barley are being germinated under varying conditions and subsequently evaluated for malting efficiency. Enzyme kinetics being investigated.

Progress: No significant trend established yet.

SUPPORTED BY Federal Inst. of Ind. Research - Nigeria

9.0058, SINGLE CELL PROTEIN PRODUCTION FROM CASSAVA WASTES

H.M. JOSEPH, (NI.550.0002)

Objective: An effort to accomplish total utilization of the cassava plant and to produce a high quality low cost staple food. Yeast has been grown successfully on cassava waste and has been added to gari.

Approach: Cultivation of Candida utilis on cassava peels in a laboratory glass fermenter. Incorporation of yeast into gari (cassava product).

Economic and technological feasibility of integrating both processes of yeast production and gari production.

Progress: Pilot plant production is being organized. 5 percent yeast incorporation into gari is organoleptically acceptable.

SUPPORTED BY Federal Inst. of Ind. Research - Nigeria

9.0059, DEVELOPMENT OF COMPOSITE FLOUR FROM NIGERIAN FOODS

T. SHAMBE, (NI.550.0003)

Objective: Large quantities of wheat are imported. This project hopes to save foreign exchange by developing a substitute. A satisfactory formula has been developed.

Approach: Experimental baking trials with derived formula. Acceptability testing with local bakeries as well as bread consumers. Economic feasibility studies.

SUPPORTED BY Federal Inst. of Ind. Research - Nigeria

9.0060, COMMERCIAL PRODUCTION OF SOY-OGI AND GARI

B. AMODU, (NI.550.0004)

Objective: Staple foods are low in protein. This project attempts to increase the protein content of gari with added protein concentrate.

Approach: Rat feeding tests for protein efficiency and toxicants.

Progress: Product found suitable for weaning children. Pilot plant production has been commenced as Soy-Ogi. Results published in British J. of Nutrition, 26, 2, 1971. Further papers in preparation.

SUPPORTED BY Federal Inst. of Ind. Research - Nigeria

9.0061, BIOLOGICAL EVALUATION OF PROTEIN ENRICHED FOOD

A.B. ONIWINDE, (NI.550.0005)

This project tries to establish that the high protein foods produced here are biologically acceptable. No harmful effects have been detected.

SUPPORTED BY Federal Inst. of Ind. Research - Nigeria

FOREST RESEARCH INSTITUTE OF NIGERIA

P.M.B. 5054, Ibadan

9.0062, FOREST TREES SPECIES TRIALS IN MOIST FOREST

G.O. DADA, (NI.150.0001)

OBJECTIVES: (a) To enhance the number of economic tree species which are fast growing and are suitable for reforestation work. (b) To determine the comparative performance of potential timber crop species in pure stands and to obtain information on their silvicultural characteristics.

APPROACH: Small replicated plots at close spacing have been used to determine the climatic and edaphic suitability of exotic and indigenous species: usually four replications of plots each of twenty- five trees at a four foot spacing. Growth plots are used to determine the behaviour in closed stands, and relative growth rates of potential timber crop species in plots of 2 ch. x 2 ch. with a usual planting spacing of 6 feet by 6 feet. Trial sites are distributed to cover broadly the range of climate and soil types in the high forest zone.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0063, FOREST TREES ESTABLISHMENT TRIALS

G.O. DADA, (NI.150.0002)

OBJECTIVES: To compare: (a) the results of using different types of nursery stock on establishment and growth in reforestation. (b) the effect of different cultural treatments and spacings on canopy closure.

APPROACH: Investigations were initiated in 1966 with small trials comparing establishment and growth for standard bags (10 inches by 2 1/2 inches by 2 1/2 inches) miniature bags (5 inches by 3 inches), and stumps of Cedrela odorata, Cordia alliodora, Nauclea diderrichii, Terminalia ivorensis and Terminalia superba. Results indicate that height growth and survival of seedlings grown in miniature bags compare favourably with standard bags and are better than results from stumps. Line mixtures of Cedrela odorata with Eucalyptus torelliana, Gmelina arborea and Nauclea diderrichii have been instituted of which Nauclea was best except on shallow soils. Direct sowing of Gmelina arborea was started in 1968 and 1969 and results have been very encouraging.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0064, SILVICULTURE - THINNING AND SPACING TRIALS

R.G. LOWE, (NI.150.0003)

Objectives: To determine the effect of controllable environment and silviculture treatment on growth of tree crop species.

Approach: Work has started on spacing and thinning trials of Tectona grandis and on spacing trials of Gmelina arborea, Nauclea diderrichii and Terminalia ivorensis. Investigations are located in the West and Mid-West States. Assessments and observations to continue in existing trials and to be extended to spacing trials of Terminalia superba and thinning trials of Gmelina arborea. Analysis is to be continued on the electronic computer.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0065, REGENERATION OF NATURAL MOIST FOREST
R.G. LOWE, (NI.150.0004)

OBJECTIVES: To study the regeneration and development of seedlings of economic species in natural moist forest, and to develop methods for promoting their establishment and growth.

APPROACH: Treatments have been either pre- or post-exploitation and have comprised various degrees of poisoning of unwanted trees with arsenite, climber cutting, removal of herbs and competing thicket.

RESULTS: After several years of research in the high forest, results indicate that the rate of regeneration is slow. For linear quarter chain sampling, it is found that only about 25 per cent of the quadrats are stocked, and that well under half of this regneration belongs to fast growing, relatively valuable species. Only twelve per cent of quadrats contain trees with much chance of eventually forming part of the final crop. Seedling growth is slow, and no seedlings achieved heights exceeding fifteen feet in ten years. Progress in regenerating the natural forest is unlikely, without a better understanding of the behaviour and growth characteristics of the various species.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0066, IMPROVEMENT OF THE TIMBER POTENTIAL OF NATURAL MOIST FOREST
R.G. LOWE, (NI.150.0005)

Objectives: (a) To estimate the potential timber productivity of the natural forests; (b) To investigate the effect of periodic exploitation on the felling cycle of the high forest trees; (c) To investigate methods of hastening the growth and yield of potential final crop trees.

Approach: An attempt is being made to determine the residual content and also the regrowth of exploited untreated forest, one chain/one quarter chain linear sampling is being conducted through both research plots and state managed areas. Permanent lines are demarcated, and about ten per cent of one square mile compartments is randomly sampled.

Trees of selected species are assessed for their position in the canopy, girth, condition of the bole; the percentage defectiveness, crown characteristics and creeper infestation.

Trees are selected for increment measurement to permit stand projection studies.

Experimental plots date from 1952 and range across the Western, Mid-Westerm and Eastern States of Nigeria.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0067, ENRICHMENT OF NATURAL MOIST FOREST
R.G. LOWE, (NI.150.0006)

Objectives: To investigate possible methods of enriching natural forest by low density planting and sowing.

Approach and Results: Attempts at sowing have more or less failed, mainly owing to depredations by vermin. Line planting has given good survival. Costs do not greatly exceed those for natural regeneration operations, but growth rates may be less than a half of those which may be expected in Taungya plantations. The method has many of the disadvantages of T.S.S. (natural regeneration system). Experimental plantings exist in the Western, Mid-Western and Eastern States and date from 1952.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0068, PREPARATION OF VOLUME TABLES FOR THE MAIN TIMBER CROP SPECIES
J.O. ABAYOMI, (NI.150.0007)

Objectives: (a) To construct volume tables for each of the following species: teak, Gmelina, Terminalia, Triplochiton and Nauclea. (b) to determine by means of regression techniques the necessary variables for construction of volume tables for the species above. (c) to relate table volumes to merchantable volume output. (d) to produce provisional volume tables for species for which no volume table has yet been prepared.

Approach: Analysis of data already collected and the collection of further measurements as needed. Maximum use will be made of electronic computer facilities.

Results: A provisional local volume table has been prepared for teak in Gambari, Olokemeji and Akilla in Technical Note No. 32. Sample tree measurements have been carried out in different areas on Tectona gradis, Gmelina arborea, Terminalia ivorensis and Nauclea diderrichii.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0069, CONSTRUCTION OF GROWTH AND YIELD TABLES FOR EVEN-AGED TREE CROPS
J.O. ABAYOMI, (NI.150.0008)

Objectives: For each of the following species: Gmelina arborea, Nauclea diderrichii, Techtona grandis, Terminalia ivorensis and Triplochiton scleroxylon. (a) To obtain preliminary yield data for the geographical range under which the particular crop is grown. (b) To correlate growth and yield with site conditions, and to determine site quality classes. (c) To produce yield tables.

Approach: A total of 34 permanent sample plots had been laid down by 1966 in pure plantations. The plots have received various thinning treatments and have undergone periodical measurements. Nine of the permanent sample plots were reassessed in 1970-71. Since 1966 thirty- seven more sample plots were laid down in various plantations established between 1949 and 1965.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0070, IMPROVEMENT OF POTTING MIXTURE IN FOREST NURSERIES
B.S. ONWELUZO, (NI.150.0009)

Objectives: (a) To investigate the mineral requirements of seedlings of major plantation species. (b) To develop and improve a cheap and universal potting mixture for Nigerian forest nurseries.

Approach: (1) Review of the existing potting medium of the major nurseries in the high forest area of Nigeria. (2) Nutrition experiments will continue on tree seedlings and to determine the deficiencies in the existing potting medium. (3) Experiments to correct the deficiencies and make prescriptions on the requirements of a cheap, effective and well balanced suitable potting medium.

Results: Preliminary work began in 1969 on the mineral requirements of the seedlings of Gmelina arborea and Terminalia superba. Report on this work is being written.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

NIGERIA

9.0071, SOIL IMPROVEMENT FOR REFORESTATION IN HIGH FOREST ZONE

S.J. EKAETE, (NI.150.0010)

Objectives: (a) To study the physical and chemical properties of infertile forest plantation soils with a view to correcting the soil conditions. (b) To discover the effect of liming and application of fertilizers on young trees in different soil types. (c) To study the seasonal dynamics of moisture and its effect on forest plantation soils.

Approach: Inspection tour of reforestation areas in the high forest zone to mark out the infertile soils. Sampling and analysis with a view to setting up experiments to study percolation and subsequent leaching and how they influence tree growth on forest soils.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0072, EFFECT OF FOREST PLANTATION ON SOIL PHYSICAL AND CHEMICAL PROPERTIES

B.S. ONWELUZO, (NI.150.0011)

Objectives: (a) To determine the effect of the various cultural treatments on soil physical and chemical properties. (b) To study the changes in major nutrients of plantation soils throughout. (c) To study the effect of a tree species on soil physical and chemical properties. (d) To study and compare the changes in soil characteristics occurring under different tree species in both the same location and other locations.

Approach: (1) Sampling and analysis of soils from new taungya farms at the start of the farm and at the start of any cultural operation. (2) Work will continue on the Pinus caribaea stand with further sampling and full physical and chemical analyses. (3) Work will be started on Gmelina arborea stands selected in various locations in the high forest zone. (4) A study will be made of other major plantation species in the high forest zone.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0073, FOREST TREES PROVENANCE STUDIES

N. JONES, (NI.150.0012)

Objectives: To determine the qualities of various provenances of indigenous and exotic species of actual or potential value in plantations.

Approach: (1) Definition of provenance boundaries within Nigeria for indigenous species included in the programme. (2) Examination of the distribution of these species outside Nigeria with a view to importing trial quantities of seed. (3) Further quantities of seed of the exotic species are required for testing and should be imported. (The Thai/Danish Teak Improvement Centre should be asked to help with this species).

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0074, SELECTION AND TESTING OF OUTSTANDING TREES OF IMPORTANT PLANTATION SPECIES

N. JONES, (NI.150.0013)

Objectives: (a) To select, centralize and preserve outstanding trees. (b) To establish clonal banks for the vegetative multiplication of selected trees. (c) To test selected trees from the most desirable provenances to assess outstanding qualities or species characters. (d) To preserve certain outstanding trees of the species at present being heavily exploited though featuring in a small way in plantation programmes.

Approach: Some trees have already been selected and clonal material from Teak, Gmelina, Nauclea and Triplochiton has been established in Ibadan. Some open pollinated seed has been collected for testing.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0075, DEVELOPMENT OF SEED STANDS AND SEED ORCHARDS

B.O. OMOYIOLA, (NI.150.0014)

Objectives: (a) To convert suitable established plantations into seed stands for the interim supply of improved seed. (b) To establish clonal seed orchards by the vegetative propagation of outstanding phenotypes. (c) To establish seed orchards from selected trees which have proved satisfactory after testing.

Approach: (i) To classify seed stands from mature plantation of species included in the various State planting programmes. (ii) To convert young plantations into clonal seed orchards when possible. (iii) To raise clonal stock for planting.

Progress: A number of small Gmelina orchards have been established in various sites in the East-Central, South-Eastern and Mid-Western States. There is one teak seed orchard in the Western State, and there are specified areas for teak seed collection in Olokemeji Forest Reserve and Akilla Forest Reserve.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0076, BREEDING FOR RESISTANCE TO VARIOUS PESTS AND DISEASES

B.O. OMOYIOLA, (NI.150.0015)

Objectives: (a) To vegetatively propagate plants found to be resistant to various insects or fungal pests with special reference to the shoot borer of the Meliaceae, Nauclea sp. (Opepe) and Terminalia sp. (Idigbo) and the gall bug of Chlorophora (Iroko). b. To find if any detected resistance is inherent.

Approach: (i) Any plant which appears resistant to the various specific pests will be collected for propagation. (ii) Vegetatively propagated material will be made available to the entomologists for testing.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0077, VEGETATIVE PROPAGATION OF SELECTED FOREST TREES

S.T. OLATOYE, (NI.150.0016)

Objectives: To determine successful methods of vegetatively propagating important plantation species.

Approach: (1) Assessment of all studies undertaken. (2) Allocation of priorities and requirements by species. (3) Examination of factors influencing the vegetative propagation of species which do not respond favourably to currently used techniques.

Progress: Quite a lot of material has been dealt with over the period 1963-70; incomplete analyses have been made. A thorough study of these results is necessary to allocate priorities.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0078, FOREST TREES SEED DORMANCY, STORAGE AND GERMINATION

S.T. OLATOYE, (NI.150.0017)

Objectives: (a) To determine whether the seeds of Triplochiton scleroxylon require any specialized treatment before or during storage. (b) To determine whether the seeds of Terminalia ivorensis and Tectona grandis require any special treatment to break dormancy and what are the best conditions for germination.

Approach: (1) Comprehensive tests to ascertain the best condition for germinating seeds of the species included in the pro-

gramme. (2) Examination of the quality of seeds of these species under different conditions of storage.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0079, GROWTH PATTERNS OF IMPORTANT TIMBER TREE SPECIES

D.E. IYAMABO, (NI.150.0018)

Objectives: (a) To study the patterns of height and diameter growth of important tree species. (b) To determine the beginning and end of tree growth and the length of the growth period. (c) To determine the relationship between seasonal and diurnal variation in growth and environmental factors, for example, rainfall, soil moisture, relative humidity, soil nutrient level, and also with internal moisture stress of the stem, carbohydrate content, et cetera. (d) To determine the distribution of radial growth along tree stems.

Results: Periodicity in girth and radial growth has been shown to occur in Cedrela odorata, Eucalyptus deglupta and Triplochiton scleroxylon (Obeche) around Ibadan (Western State). Seasonal variation also occurs in the starch content of Obeche in Sapoba (Mid-West State) and Mamu (East-Central State).

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0080, PRODUCTIVITY OF NATURAL FORESTS OF NIGERIA

J.R. CHARTER, (NI.150.0019)

Objectives: To obtain accurate data on the synecology and primary productivity of a range of natural forest types in Nigeria, including:- (a) mangrove; (b) swamp forest; (c) moist forest; (d) dry forest; (e) woodland; and (f) tropical steppe.

Approach: Establish and assess further sample plots in mangrove, swamp forest, dry forest, woodland and tropical steppe; re-assess moist forest plots. Investigate methods of biomass measurement.

Results: Basal area per acre varies from a maximum of 160 square feet in the better-structured moist forests to 119 square feet in the poorer; total number of tree species was 108 in the semi-deciduous forest in the West rising to 160 in the evergreen types; girth increment among the commonest (lower or middle storeys) species showed a considerable range of variation within girth-classes on the same site: low values between 0.10 and 0.20 inches per annum were average. In climber tangle, canopy level was raised at two feet per annum and thorny species such as Acacia and Entada diminished in density.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0081, MAP OF THE NATURAL VEGETATION OF NIGERIA

J.R. CHARTER, (NI.150.0020)

Objectives: To describe and map the natural vegetation of Nigeria. A large amount of information on the ecology of Nigerian vegetation is now available, and there is a need for up-to-date maps and descriptions of types.

Approach: (1) Write descriptive text for forest and savanna zones. (2) Carry out further field surveys in botanically little known areas of Nigeria; correlate vegetation data with air photo mosaics and other ground surveys, prepare draft vegetation maps of the States.

Progress: A body of vegetation data has been abstracted from all sources, and a preliminary version of a map on a scale of 1:3 million has been prepared for the Nigerian National Atlas.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0082, DISTRIBUTION PATTERNS OF YOUNG ECONOMIC TREE SPECIES AND THEIR CORRELATION WITH ENVIRONMENTAL FACTORS

O.T. OKUSANYA, (NI.150.0021)

Objectives: (a) To determine quantitatively, the pattern of distribution of seedlings and saplings of economic tree species and the factors which are responsible for the distribution. (b) To determine the type of association between the species. (c) To study the effect of environmental factors on the growth of selected species.

Approach: Within permanent sample plots in the moist forest, suitable methods of pattern and co-variance analysis would be applied to the seedlings and saplings of the economic tree species encountered in the plots.

Sampling would be carried out over a period of years and during different seasons of the year, environmental factors to be studied would include soil depth, water table, soil moisture content, precipitation, mineral concentration, pH, et cetera.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0083, CLASSIFICATION AND DISTRIBUTION OF MOIST FOREST VEGETATION TYPES

O.T. OKUSANYA, (NI.150.0022)

Objectives: (a) To classify the vegetation into types which could be of use in determining silvicultural treatments. (b) To compile distribution maps of Nigerian trees of economic importance.

Approach: (1) Collection of adequate data from several sample plots in the existing forest reserves and classify using suitable methods of ordination analysis. Particular attention will be paid to those areas near the boundaries of the existing vegetation map. (2) Employing mechanically-sorted cards, preparation of an index from distribution data from botanical and silvicultural records and other sources. Compilation of distribution maps of species where data are adequate.

Progress: (a) This is a new project. (b) A record system of punched index cards employing the Nigerian map grid has been devised; and available distribution data abstracted from records.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0084, FLORA OF NIGERIA

Z.O. GBILE, (NI.150.0023)

Objectives: Production of an illustrated flora of as many genera of vascular plants as possible, written in simple terms for readers who are not specifically trained in Botany.

Progress: Work started in 1957, Nigerian Trees Volumes I and II and the section on Grasses have been published. The section on Cyperaceae is now being drafted by J. C. Lowe and D. P. Stanfield. Work is in progress on the Malvaceae.

Since preliminary studies on the genus Sida (Malvaceae) are already in progress, the section on Malvaceae will be taken up in the Herbarium. The studies will be based on existing data and freshly collected materials.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0085, COMPILATION OF VERNACULAR NAMES OF NIGERIAN PLANTS

Z.O. GBILE, (NI.150.0024)

Objectives: To serve as useful aids to Chemists, Pharmacologists, et cetera, who are particularly interested in the use of Nigerian plants.

Progress: Status: all available data obtainable on all the families represented in the Forest Herbarium have been compiled. A first draft is under preparation.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0086, CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES
M.A. ODEYINDE, (NI.150.0025)

Objectives: (a) Survey of disease incidence on different plantation tree species. (b) Studies of physical properties of teak soils to find out any correlation between disease incidence and soil conditions. (c) Natural control method.

Certain plantation tree species, for example Tectona grandis, Gmelina arborea and Terminalia ivorensis, are susceptible to root diseases. A survey made in 1966 revealed a 15-20 per cent loss in one teak plantation. The situation is definitely worse now than before and requires prompt attention to mitigate incidence and spread.

Progress: Work on chemical control methods was initiated in 1966. Tillex has been tried at two per cent against root rot disease in Ibadan, Kabba, Idah and Oturkpo areas.

Work on pre-treatment of site before planting was initiated in 1967. A new plot was also laid out in 1970.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0087, BIOLOGY OF CAUSAL ORGANISMS OF ROOT ROT OF PLANTATION TIMBER SPECIES
M.A. ODEYINDE, (NI.150.0026)

Objectives: (a) Collection and identification of root rot pathogens. (b) Culturing and preservation of cultures of the pathogens. (c) Establishment of pathogenicity, mode of infection and spread.

Approach: It is planned to make cultures both from diseased trees and fructifications for cross reference, to inoculate healthy trees with associated pathogens and to study mode of infection and spread of the pathogens.

Progress: Some fructifications already collected and identified.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0088, FUNGAL DISEASE OF SEEDS AND SEEDLINGS
M.A. ODEYINDE, (NI.150.0027)

Objectives: (a) To survey the fungal flora of viable forest tree seeds. (b) To continue the survey to seedling stage. (c) To determine probable relationship between fungal presence and seedling health.

Germination losses in the nursery reach between 5-25 per cent in some species.

The discovery of relationship between fungal presence and seed health will go a long way in minimizing seed wastage since it will then be possible to find appropriate control measures.

Approach: (1) Testing for seed viability. (2) Assaying fungal flora on fresh and stored seeds and very young seedlings. (3) Assessing importance of seed-borne fungi with relevance to seed and seedling health.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0089, ESTABLISHMENT OF PINE MYCORRHIZAS
M.A. ODEYINDE, (NI.150.0028)

Objectives: To obtain suitable fungi as mycorrhizal partners for pines.

Pine seedlings survive and grown best when mycorrhizas are established on their roots. Because of the envisaged importance of pines in the economy of the country this project is necessary to assure minimum expenditure on pine establishment.

Approach: It is planned to collect fructifications of basidiomycetous fungi known to form mycorrhizal association and use these in different forms to inoculate seedling roots.

Progress: This is transferred from the Silviculture Section where work was initiated on how to obtain satisfactory strains of mycorrhiza fungi.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0090, SURVEY AND COLLECTION OF INSECT PESTS IN NURSERIES AND IN TREE PLANTATIONS IN NIGERIA
M.O. AKANBI, (NI.150.0029)

Objectives: (a) To establish in Ibadan a representative collection of forest insects of nurseries and plantations in Nigeria, to be used as a reference collection for research and teaching. (b) To spot outbreak of new insect pests or the spread of existing ones and devise appropriate control measures.

Approach: Collections to be made throughout the year on all indigenous and exotic tree species in Nigeria; setting, mounting and storage of insect pests collected; identification and final preservation.

Progress: Insects numbering about 6,000 dry specimens made up of about 385 species, 95 families and eight others have been collected and preserved. Some of these have been identified and others are being identified.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0091, SURVEY AND CONTROL OF INSECT PESTS ON TIMBER
M.O. AKANBI, (NI.150.0030)

Objectives: (a) To establish in Ibadan, a representative collection of insect pests of timber in Nigeria, to be used as a reference collection. (b) To device appropriate means of control.

Approach: Collection, setting, mounting, storage of insect pests and breeding out materials from log materials collected - with particular emphasis on control.

Progress: Some insects mainly beetles, have been identified and preserved; others have been sent to United Kingdom for identification where local identification was difficult or impossible.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0092, TAXONOMY, BIOLOGY AND CONTROL OF BORERS OF MELIACEAE
M.O. AKAMBI, (NI.150.0031)

Objectives: (a) To determine the species of mahogany shoot borers important in Nigeria, their respective distribution, parasites and host range. (b) To explore the possibility of an economic chemical control in nurseries and plantations. (c) To study the possibility of increasing the resistance of some species of mahogany, especially Khaya, to shoot borer attack by selective breeding.

Approach: (1) Collection of shoots, stems, fruits, flowers (and the associated Hypsipyla) of Meliaceae in different parts of the country throughout the year to determine the exact taxonomic position. (2) Field and laboratory experiments.

Progress: (a) Hypsipyla known to be an important economic pest in Nigeria; more than one species known to be involved and results of the involvement of shoot, stem, wood, flower and fruit

borers already published. (b) This insect problem is an international one involving most mahogany growing countries.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0093, STUDY OF BIOLOGY AND CONTROL OF BORERS

M.C. AKANBI, (NI.150.0032)

Objective: Study of the biology and control of Orygmophora medio- feveata (the Opepe shoot borer), Tridesmodes remiculata (the shoot borer of Terminalia ivorensis) and Anaphe venata the defoliator of Obeche.

To conduct a comprehensive survey, and study in detail the biology and ecology of these pests in order to find possible economic control methods.

Approach: Survey, collection, field and laboratory studies which provide requisite data required for difining pertinent control measures.

Progress: Preliminary investigations have shown that all the insects involved are of importance and some results have been published.

Preliminary observation has shown that Anaphe venata attack may adversely influence certain physiological aspects of the host plant, namely, flowering and fruiting cycles. It is thus worthwhile to curb the activities of these insects.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0094, INSECT PESTS ON FLOWERS, SEEDS AND SEEDLING OF FOREST TREES

M.O. AKANBI, (NI.150.0033)

Objectives: To survey and study the relationships and influences of insects on seed production and germination.

Since the availability of seeds is a vital prerequisite to the current expansion programmes of a forestation as well as the introduction of exotics into Nigerian forestry, it is pertinent to give due attention to the supply of seeds. Insect activities in relation with flowers, seeds and seed viability have been known for ages to be of sizeable proportion. Thus, in order to produce and keep healthy seeds (both of indigenous and exotic species) to meet set targets in a forestation programme, the insect problems, among others, must be given proper attention, and desired solutions found.

Approach: (1) Survey and collection of seed insects with full attention given to detailed studies of potentially dangerous seed insects, in order to find methods for their control. (2) Quarantine activities to be continued.

Progress: A relatively new project. Report of preliminary investigation of the insects on flowers and fruits of some mahogany species has been published.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0095, STUDY OF PROPERTIES AND CHARACTERISTICS OF NIGERIAN FOREST TIMBER SPECIES

S.A. GIWA, (NI.150.0034)

Objectives: (a) To examine and record on card keys, the anatomical features of the timber; to study the wood characteristics and to collate relevant data for each species. (b) To determine the mechanical and physical properties by tests on small clear specimens. (c) To assess the amenability to treatment with water-borne preservatives, and the resistance of treated and untreated wood to attack by fungi and insects. (d) To determine kiln drying schedules, air drying characteristics and related properties. (e) To evaluate machining and wood working properties.

Progress: This is a continuing project which started in 1961/62. Thirty-four species have been tested and the results of completed investigations have been published.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0096, STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS

S.A. GIWA, (NI.150.0035)

Objectives: (a) To study the anatomical features and to determine the mechanical and physical properties, the amenability to preservative treatments, the drying characteristics and wood-working properties of plantation grown timbers. (b) To determine the potential of plantation grown timbers for wood-based industries.

Progress: This is a new project.

Work will start with the following species:- Tectona grandis, Gmelina arborea, Terminalia ivorensis, Triplochiton scleroxylon, Nauclea diderrichii.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0097, THE PERFORMANCE OF TIMBER JOINTS AND FASTENINGS FOR INDUSTRIAL APPLICATION

A.J. COMBEN, (NI.150.0036)

Objectives: (a) To investigate the strength and suitability of timber connecting devices, with a view to encouraging the wider application in construction of the most efficient types. (b) To derive working loads in respect to species and connecting media.

The methods currently used are largely traditional and there is much scope for the introduction of more efficient and economical devices for joining wooden members together.

Approach: Tests will be carried out on joints made with nails, bolts, metal connecting devices of special types and adhesives.

Progress: Tests have been completed on joints made in Opepe using locally manufactured and imported split ring connectors; a report is being prepared. Tests are currently being undertaken on proprietary plate connector with integral teeth.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0098, FABRICATION AND TESTING OF TIMBER STRUCTURES AND COMPONENTS

A.J. COMBEN, (NI.150.0037)

Objectives: (a) To promote the more efficient and economical use of timber and plywood, and its wider application in building and construction in Nigeria. (b) To make available to engineers, architects and industrial users information relating to the use of timber in building and construction.

Approach: (1) Fabrication of timber and composite timber/plywood components and structures and glued laminated members in order to demonstrate the uses of timber and plywood in construction. (2) Mechanical testing of the various units to study the performance and to achieve improvements in design, manufacture, et cetera. (3) Preparation of a for a draft Code of Practice relating to the use of timber in construction.

Progress: The Timber Engineering Laboratory constructed of timber and plywood and assembled by nailing has now been completed. This is in itself, a demonstration building.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

NIGERIA

9.0099, NIGERIAN GROWN SPECIES FOR TRANSMISSION POLES

A.J. COMBEN, (NI.150.0038)

Objectives: (a) To determine the suitability of Nigerian grown timbers for transmission poles and to promote the wider use of suitable species. (b) To provide data on which standard specification can be based.

There is a considerable and increasing demand in Nigeria for wooden poles for transmission purposes. For many years, they were imported but now suitable species are available from plantations within the country.

Approach: (1) Determination of the strength, drying and preservation properties of poles. (2) Revision and amendment of the Nigerian Standard Specification for wood poles (1965) and the inclusion of acceptable pole species.

Progress: Tests have been completed on Opepe (Nauclea diderrichii) and teak (Tectona grandis). Both species have been found suitable.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0100, CONVERSION STUDIES ON A HORIZONTAL BANDSAW

B.O. ONI, (NI.150.0039)

Objectives: (a) To assess problems associated with log conversion using a C.D.4 bandsaw, and to evaluate the quality of the sawn products. (b) To determine the most satisfactory sawing conditions and techniques.

Any improvement in lumber quality will contribute towards the more efficient and wider utilization of such abundant species.

Approach: Investigations will be carried out on local logs. The timber will be converted, using standard techniques and the effect of saw blade variables such as tooth shape and 'set' will be assessed.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0101, NIGERIAN TIMBERS FOR SPORTS GOODS

B.O. ONI, (NI.150.0040)

Objectives: To determine and demonstrate the suitability of Nigerian grown wood for the manufacture of sports goods.

Many wooden and partly wooden sports goods are imported into the country. Nigeria has several wood species which could be used as substitutes.

Progress: Billiard cues have been made to standard specification using species with the requisite properties such as Holoptelia grandis. Comments have been requested from various users to whom they were supplied. A report is to be prepared.

Work is to be carried out on the suitability of some species for the making of cricket bats.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0102, SURVEY OF WOOD DENSITY VARIATION OF SOME NIGERIAN TREE CROPS

B.A. OLAADAMS, (NI.150.0041)

Objectives: To investigate the variation in density of certain plantation species grown on different sites.

Density is an important characteristic influencing wood quality; it is frequently heritable and susceptible to genetic improvement and therefore of importance in tree breeding for superior quality timber.

It is also directly related to pulping yields, closely correlated with strength and indicative of certain other properties.

Wood specimens will be taken at pre-determined positions from selected trees on given sites by increment core borers or by other means. Density determinations will be made; in addition, fibre characteristics will be examined, moisture contents determined and girth measurements taken.

The following species will be considered:- Nauclea diderrichii, Terminalia ivorensis, Triplochiton scleroxylon, Gmelina arborea, Tectona grandis.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0103, CELLULOSE CONTENT OF NIGERIAN TIMBERS

S.A. GIWA, (NI.150.0042)

Objectives: To determine the proportion of cellulose in various Nigerian timbers.

The determination of the cellulose content of these species will provide a preliminary indication of their pulpwood quality.

Approach: Determination of the percentage of cellulose in Nigerian woods, especially plantation species.

The following species will be considered: Gmelina arborea, Triplochiton scleroxylon, Terminalia ivorensis.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0104, THE SUITABILITY OF NIGERIAN TIMBERS FOR RAILWAY SLEEPERS

S.A. GIWA, (NI.150.0043)

Objectives: (a) To determine the relative suitability of certain timbers for use as railway sleepers. (b) To compile a list of acceptable species.

Wooden railway sleepers are widely used in Nigeria and they have advantages over steel and concrete.

Approach: Treatability with preservatives and strength tests will be made on certain species which are considered likely to be suitable.

Progress: A survey of wooden sleepers in service, to determine sources and nature of deterioration has been completed. Deterioration was found to be due mainly to biological agents, drying and subsequent shrinkage, mechanical action and burning.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0105, SOLAR AND AIR DRYING OF TIMBER

E.O. ADEMILUYI, (NI.150.0044)

OBJECTIVES: To develop a simple, inexpensive but efficient method of drying sawnwood in Nigeria. Thousands of cubic metres of wood are wasted annually, because seasoning is not carried out or is inadequate. The capital expenditure involved in the construction of conventional drying kilns is beyond the reach of local sawmillers, and a relatively inexpensive means of drying timber is required.

APPROACH: (1) Determination of the efficiency of a solar kiln in drying timber in the humid forest zone. (2) Comparison of solar drying and air seasoning on the basis of drying time, running cost and quality of lumber dried.

PROGRESS: An experimental solar drying kiln has been built in the laboratory, and is now being further developed. A preliminary report is to be prepared on the following species that have been tested. Lagos mahogany, Iroko, Obeche, dry zone mahogany, Holoptelia grandis and Cola gigantea.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0106, SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA
E.O. ADEMILUYI, (NI.150.0045)

Objectives: (a) To investigate the periodic variations in equilibrium moisture content of wood in use under varying exposure conditions. (b) To establish the moisture content to which wood should be dried before use, in specific areas of Nigeria.

Shrinkage or swelling of timber inevitably occurs, and troubles frequently result if timber does not have appropriate moisture content when it is put into use.

It is necessary therefore to obtain data relating to the equilibrium moisture content of wood in different geographical locations and under various exposure conditions, so that timber can be dried accordingly, if such troubles are to be minimized.

Approach: A preliminary survey will be made in the Ibadan area, and extended later to other parts of the country.

The following species will be tested in the first instance: Opepe, Lagos Mahogany, Obeche.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

GAMBARI EXPERIMENTAL STATION
Ibadan

9.0107, INTRODUCTION AND ESTABLISHMENT OF COCOA GERMPLASM
J.O. SANWO, (NI.091.0001)

Objective: To introduce and establish cocoa germplasm noted for specific characteristics, such as, high yield, desirable commercial qualities, black pod resistance, CSSV tolerance or resistance, vegetative vigour, etc.

Approach: Collection and evaluation of both bud-wood and seeds and assessment under different environmental conditions at different locations.

Progress: Preliminary evaluations of internanay, interparinery, interequitos hybrids introduced from Trinidad are being made; preliminary evaluation of 10 introduced progenies from Wageningen was also made.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0108, CYTOGENETIC STUDIES IN COCOA
V.J. JACOB, (NI.091.0002)

Objective: To develop cytological techniques for studying mitotic and meiotic stages in cocoa. Detailed studies on self-incompatibility system with a view to overcoming it in cacao cultivars and interspecific specific hybridization in Theobroma in order to introduce desirable characters from wild species into cacao.

Approach: Squashing, smearing and microtome sectioning for cytological studies; controlled hand pollinations with various modifications for self incompatibility studies and interspecific hybridization.

Progress: Cytological techniques are being standardized; suitable methods were developed for producing inbred progenies from self incompatible cultivars of cacao. Interspecific hybridization is in progress. Unilateral incompatibility was observed among the species.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0109, DIALLELE CROSSING PROGRAMME IN CACAO
V.J. JACOB, (NI.091.0003)

Objective: To produce a large number of genotypes by combining 34 desirable selections in all possible combinations and to make preliminary evaluation of the progenies for yield, establishment ability and disease resistance.

Approach: Establishment of 15 plant progeny rows at different locations.

Progress: Preliminary evaluation of 106 crosses for compatibility, growth establishment and precocity in production has been made.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0110, BREEDING FOR ESTABLISHMENT ABILITY AND DROUGHT RESISTANCE IN COCOA
V.J. JACOB, (NI.091.0004)

Objective: To develop cacao varieties with high degree of drought resistance or establishment ability for marginal areas.

Approach: Field trials (establishment ability trials) involving many progenies in different ecological zones. Evaluation of percentage survival after the first two dry seasons, canopy score, trunk diameter, percentage jourquetting and precocity in production.

Progress: Fifteen progenies which are called CRIN. The establishment of ability elite progenies were selected from these trials.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0111, BREEDING FOR BLACKPOD RESISTANCE IN CACAO
V.J. JACOB, (NI.091.0005)

Objective: Development of Cacao varieties and cultivars resistant to blackpod (Phytophthora pod rot) disease.

Approach: Field trials and screening at nursery stages for root- resistance. Screening by pod innoculation technique.

Progress: First selections include 6 clones. (2 possible resistant, 2 partial escapers and 2 escapers). Many genotypes from F2 Amazon populations are selected for blackpod resistance. Screening methods for both seedlings and pods are being developed.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0112, BREEDING COCOA FOR HIGH YIELD AND DESIRABLE COMMERCIAL QUALITIES
V.J. JACOB, (NI.091.0006)

Objective: To develop varieties with high yield potential and desirable commercial qualities.

Approach: Establishment of yield trials involving general purpose varieties and progenies and the assessment of yield components and quality factors.

Progress: Methods for the assessment of yield components and quality factors were standarized. Field trials are in progress involving CRIN elites, Trinidad (internanay, interparinary and inter- equitos) progenies, F3 Amazon and Amelonado and other promising progenies.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0113, BREEDING FOR CACAO SWOLLEN SHOOT VIRUS RESISTANCE OR TOLERANCE IN CACAO
V.J. JACOB, (NI.091.0007)

Object: Production of varieties resistant or tolerant to C.S.S.V.

Approach: Diallel crossing and top crossing methods; screening progenies at seed, seedling and adult tree stages: both nursery and field screening techniques are to be developed.

Progress: Screening techniques (nursery and field) are being standardized. Top crossing and diallel crossing are in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0114, MUTATION BREEDING IN CACAO AND KOLA
V.J. JACOB, (NI.091.0008)

Objective: To produce desirable cacao mutants especially those with some degree of resistance to black pod disease and to develop dwarf kola mutants.

Approach: Irradiation of cacao and kola seeds and bud woods with various dosages of gamma rays from a Co 60 source and scoring percentage survival, vegetative growth and seedling characteristics.

Progress: LD/50 values for both cacao and kola seeds and vegetative buds have been worked out.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0115, STUDIES ON VARIOUS YIELD FACTORS IN COCOA
V.J. JACOB, (NI.091.0010)

Objective: To study the contribution of various yield factors (components) and to determine how these factors are affected by seasonal variations.

Approach: Weekly and monthly pod treatment involving major varieties and cultivars. Both wet and dry weight methods are being employed.

Progress: Yield components and their variations in Amazon, Amelonado Trinitario varieties and other cultivars have been studied extensively.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0116, GERMINATION AND GROWTH STUDIES IN COCOA
O.A. ODEGBARO, (NI.091.0011)

Objective: To study the critical factors aiding germination and growth of cocoa.

Approach: Nursery germination studies. Growth analysis techniques.

Progress: Standard germination practice has been established. Growth analysis of Amazon and Amelonado have been compared. Results of other analysis are helping to elucidate the establishment and potentials of cocoa seedlings.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0117, INCREASING COCOA YIELDS BY PHYSIO-AGRONOMIC TECHNIQUES
G.A. ASHIRU, (NI.091.0012)

Objective: To increase the yield of cocoa beans per acre.

Approach: Prevention or reduction of cherelle wilt in cocoa. Improved methods of pruning and harvesting cocoa; development of twin stemming in cocoa for early and better yield/tree/acre.

Progress: Information to date showed that biological cherelle wilt can be reduced but not the physiological wilt. A 20% wilt reduction increases yield by up to 40%.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0118, STUDIES ON FIELD ESTABLISHMENT OF COCOA
O.A. ODEGBARO, (NI.091.0013)

Objective: To find best and most economic methods of planting and managing cacao trees for best yields.

Approach: Various trials on spacing, establishment and propagation techniques, best type of shade plants, light requirements of cocoa etc.

Progress: Standard techniques already exist for planting and establishing cocoa. Light requirements are still being studied.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0119, STUDIES ON TREE CROP REHABILITATION
O.A. ODEGBARO, (NI.091.0014)

Objective: To find the best ways of replacing old cacao and kola trees, diseased/insect damaged trees or old variety with improved type.

Approach: Various techniques including planting young ones under old mature trees, budding and grafting improved material on old or insect damaged coppiced trees.

Progress: The methods of planting young ones under the old trees and budding/grafting improved materials on coppiced trees have been established.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0120, WEED STUDIES IN TREE CROPS
A. KOMOLAFE, (NI.091.0015)

Objective: To identify problem weeds in tree crops and find best methods of control.

Approach: (1) Survey and identification of weeds; (2) Ecology of weeds; (3) Cultural control: slashing, ringweeding, row weeding, mulching, growing legumes. (4) Chemical control using various types of selective herbicides.

Progress: Over 160 weed species have been identified but few have been observed to constitute problems. Studies are in progress on weed ecology. Experiments are in progress on cultural and chemical weed control.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0121, COCOA FERTILIZER TRIALS
T.I. OMOTOSHO, (NI.091.0016)

Objective: To establish the fertilizer requirements for cocoa.

Approach: NPK factorial trials on mature Amelonado and Amazon cocoa.

Progress: Fertilizer recommendations already exist for Amelonado Cocoa. Cocoa responds well to N & P on most of the cocoa growing soils. Ca & K contents appear adequate.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0122, SOIL PHOSPHORUS STUDIES
T.I. OMOTOSHO, (NI.091.0017)

Objective: To investigate the fate of inorganic P added to cocoa growing soils in relation to the phosphorus nutrition of cocoa.

Approach: P analyses of samples taken from different horizons of profiles dug in plots receiving various levels of P application.

Progress: Preliminary results on the rate, form and location of P fixation in some soils have been obtained. Further work is in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0123, STUDIES ON SOIL ORGANIC MATTER
T.I. OMOTOSHO, (NI.091.0018)

Objective: To evaluate the contribution of soil organic matter to cocoa nutrition.

Approach: Estimation of soil organic P, organic C, total nitrogen and organic sulphur in several cocoa growing soils. Relationship between these components and organic P will be statistically defined.

Progress: These components have all been found to be significantly correlated with organic P. Further work in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0124, MICRONUTRIENTS IN TREE CROP NUTRITION
N.E. EGBE, (NI.091.0019)

Objective: To see whether irregular and low yields of cacao, kola and coffee can be corrected by micronutrient applications.

Approach: Identification of micronutrient deficiency symptoms; soil and leaf analyses. Soil and foliar application of various rates of micronutrients.

Progress: Deficiency symptoms of boron, zinc, and iron have been identified and corrected in cacao, kola and coffee.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0125, ROOT STUDIES ON COCOA, CASHEW AND KOLA
J.A. FALADE, (NI.091.0020)

Objective: To study rooting patterns of cocoa, cashew and kola and show how they are affected by soil properties, environmental conditions and cultural practices.

Approach: Plants are grown in containers or in the field. Roots are estimated by either excavation, digging profile pits or using root observation. Chambers for in situ studies.

Progress: Just started.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0126, STUDIES ON THE EPIDEMIOLOGY OF PHYTOPHTHORA PALMIVORA
A.A. ADEBAYO, (NI.091.0021)

Objective: To provide information on factors which affect the resting stages, initiation and spread of the disease with a view to attacking the pathogen at the most vulnerable period in its life cycle.

Approach: A detailed study of the role of the canopy, flower cushions, roots, unharvested pods and heaps of discarded pods in the survival of the pathogen over the dry season. Spread of the pathogen in establishing disease during the rainy season.

Progress: There are indications that bark cankers which develop from unharvested pods and cacao roots in heavily littered plantations serve as ready source of inoculum for new infections after the dry season. More results on other factors affecting the survival of the pathogen are being compiled.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0127, BIOLOGY AND PHYSIOLOGY OF PHYTOPHTHORA PALMIVORA
A.A. ADEBAYO, (NI.091.0022)

Objective: To elucidate the factors affecting the parasitic action of Phytophthora palmivora.

Approach: The effect of carbon source, carbon/nitrogen ratios and organic amendments on the survival of propagules of P. palmivora and how the relative growth rates and net assimilation of the host affect the establishment, virulence and the evolution of strains of P. palmivora are being investigated.

Progress: Isolates of P. palmivora which differ in virulence have been found while the growth of pathogen has been found to be influenced by changes in the biochemical and physiological activities of the host tissue.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0128, FIELD CONTROL OF PHYTOPHTHORA PALMIVORA ON COCOA
G. FILANI, (NI.091.0023)

Objective: To reduce the incidence and occurrence of Blackpod disease of cocoa by fungicidal spray.

Approach: 1) Spraying of different fungicidal formulations in the field, including Bordeaux mixture as the standard. 2) The use of wettable or oil based fungicides; or the incorporation of stickers and wetters in conventional fungicides. 3) Soil spraying with a view to controlling the phase of the life cycle of the fungus occurring in the soil. 4) A combination of spraying and sanitation practices - including shade reduction.

Progress: Standard routine spray recommendations are available; improvements are expected from work in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0129, THE COCOA SWOLLEN SHOOT VIRUS DISEASE PROJECT
M.O. ADEGBOLA, (NI.091.0024)

Objective: To determine the identity of the virus pathogen, host reaction to infection, the ecology of vectors and the most efficient and economical method of control.

Approach: 1) Symptomatology and effects of virus infection on host varieties; 2) relationship between isolates of virus, number of infecting strains and degree of pathogenicity; 3) sources of inoculum potential and methods of their limitation; 4) the ecology and biology of the insect vector in relation to prevention of spread.

Progress: The complex nature of the infecting virus is now recognized and the adverse effects on trees of different ages are progressively being studied as a long term project. The efficiencies of the various species of the insect vectors are being ascertained. Physical characteristics of isolates/strains of the pathogen are being established with the aids of serological techniques and electron microscopy. Efficiencies of recognized wild hosts as sources of inoculum potential are being investigated.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0130, BIO-ECOLOGY OF THE COCOA MIRID
W.E. EGUAGIE, (NI.091.0025)

Objective: To obtain bioecological information as a basis for planning control strategies.

Approach: (1) Spatial and regional distribution of mirids on cacao trees of different varieties. (2) Factors affecting fecundity of mirids. (3) Seasonal variation in sex ratio in relation to mortality and life cycle. (4) Characteristics of mirid populations in farms of different ages and cacao varieties, a comparative study.

Progress: (a) Mirids are patchily distributed in farms. (b) Mirids are locally distributed preferably at branch unions and angles between pods and trunks. (c) Fecundity varies with individuals; type of food etc. (d) No seasonal variation in sex ratio which is approximately 1:1. (e) Mirid populations in young farms tend to decrease at a faster rate during post-peak phase in early dry season.

NIGERIA

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0131, CONTROL OF MIRIDS ON COCOA

W.E. EGUAGIE, (NI.091.0026)

Objective: To select suitable insecticide(s), alternative to Gamma-BHC for control of Sahlbergella singularis Haglund (Heteroptera).

Approach: Potential miricides are tried in the field on (a) small scale, (b) large scale, and (c) for side effects and taint.

Progress: About 13, 5 and 4 insecticides were tried under categories a, b, and c above between 1969 and 1972. Three have been selected from (a) to be tested in (b). Two have been selected from (b) to be tested in (c). Two have been selected from (c) as being possible alternatives to BHC. Testing continues.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0132, BATHYCOELIA THALASSINA (HETEROPTERA) ON CACAO

W.E. EGUAGIE, (NI.091.0027)

Objective: To understand abundance of B. thalassina on cacao and its economic significance.

Approach: (1) Geographical distribution on varieties of cacao in Nigeria. (2) Population census of all stages of the insect on selected cacao plots at regular intervals. (3) Identification and assessment of importance of natural enemies of B. thalassina.

Progress: (a) B. thalassina occurred in most cocoa-growing localities of Lagos, Western, Mid-Western, Kwara and East Central States. (b) About 25 percent of Amazon and 5 percent of Amelonado farms were infested. (c) B. thalassina population shows two peaks corresponding to those of fruiting each year. (d) Nymphs and adults are parasitised by Tachinid fly.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0133, COLLECTION AND ESTABLISHMENT OF KOLA GERMPLASM

L.K. OPEKE, (NI.091.0028)

Objective: To assemble desirable Kola clones from West Africa - its home of origin - and to describe and evaluate them for future improvement programmes.

Approach: Kola groves in the West African Kola belt will be explored and selections of both Cola nitida and C. accuminata will be made on the basis of desirable tree size, male/female flower ratio, nut characteristics and yield. These selections will be further characterized and evaluated after establishing them in germplasm collections.

Progress: About 56 trees have already been selected and established. These are all C. nitida. More will be selected soon from preliminary results being obtained.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0134, CYTOGENETIC STUDIES IN KOLA

V.J. JACOB, (NI.091.0029)

Objective: To study self incompatibility mechanism and genetic sterility due to interspecific hybridization.

Approach: Squashing, smearing and microtome methods for cytological studies; controlled hand-pollinations with various modifications for incompatibility studies and interspecific hybridization of C. nitida and C. acuminata. Pollen fertility of the hybrids assessed through stainability and in vitro culture.

Progress: Incompatibility mechanism has been identified; performances of interspecific hybrids is being studied.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0135, BREEDING FOR SUPERIOR GENOTYPES OF COLA NITIDA AND COLA ACUMINATA

V.J. JACOB, (NI.091.0030)

Objective: To develop general purpose varieties with high yield and desirable nut characteristics.

Approach: Variety and progeny trials at different locations involving 'Labochi white' 'Agege Red' and Moor Plantation pink varieties.

Progress: Field trials are in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0136, DIALLEL CROSSING PROGRAMME IN KOLA

V.J. JACOB, (NI.091.0031)

Objective: To produce a large number of progenies involving all the available selections and to make preliminary identification and evaluation of promising genotypes.

Approach: Establishment of progeny rows in different ecological zones and assessment of vegetative growth, flowering pattern and precocity.

Progress: A number of progenies were identified as vigorous, precocious and with favorable flower ratios and nut characteristics.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0137, STUDIES ON VARIOUS YIELD AND QUALITY FACTORS IN KOLA

V.J. JACOB, (NI.091.0032)

Objective: To study the yield components, yield potential and nut characteristics of Kola selections, progenies and clones.

Approach: Both open pollinated and hand pollinated fruits are being used in the assessment. Effect of age, location and season on yield components and chemical composition of nuts, especially caffeine content, is being studied.

Progress: Production potential, in terms of numbers of nuts per tree and nut weight, of most of the selections has already been assessed.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0138, STUDIES ON GERMINATION, GROWTH AND ESTABLISHMENT OF KOLA

B. IBIKUNLE, (NI.091.0033)

Objective: (1) To study seed dormancy and factors affecting germination and growth of seedlings and clones. (2) To study various methods of kola establishment.

Approach: Field trials and nursery experiments involving vegetative growth measurements by dry weight methods. Spacing trials, use of cover crops, study of various pruning techniques.

Progress: Methods have been developed to break seed dormancy in Cola nitida and to increase the speed as well as percentage of seed germination. Establishment trials are in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0139, STUDIES ON FLOWERING AND POD PRODUCTION IN KOLA (C. NITIDA)

G.A. ASHIRU, (NI.091.0034)

Objective: To study the development of floral abnormality in kola, and to correlate flower production pattern with yield.

Approach: Laboratory studies on pollen germination and growth. Application of growth chemicals to mature plants to

change flower production patterns as well as male to female sex ratio.

Progress: Abnormalities observed in flower germination and growth offer possible explanations for incompatibility in kola. Applications of chemicals at the right dosage and time led to simultaneous production of a desirable proportion of female to male flowers.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0140, VEGETATIVE PROPAGATION OF KOLA
G.A. ASHIRU, (NI.091.0035)

Objective: (1) To develop suitable and economic methods for the vegetative propagation of kola selection. (2) To study the periodicity in rooting, budding marcotting and grafting success.

Approach: Use of concrete rooting bins and simple improvised low cost rooting bins; hormonal treatments.

Progress: Standard techniques have been developed for the propagation of kola selections by rooting, budding and grafting. Marcotting is still in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0141, KOLA NUTRITION PROJECT
N.E. EGBE, (NI.091.0036)

Objective: To study the nutritional requirements of kola.

Approach: Soil and leaf analyses from kola grooves as indications of nutrient levels. Factorial fertilizer experiments to establish macro- and micro-nutrient requirements for establishment, growth and production.

Progress: No statistically significant responses to NPK fertilizer application have been obtained yet.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0142, DISEASES OF KOLA IN NIGERIA
A.A. ADEBAYO, (NI.091.0037)

Objective: To investigate the role of diseases in kola productivity and establish appropriate control measures.

Approach: Studies on the epidemiology and control of Fomes root diseases in particular and others in general.

Progress: Fomes infection was found to be least, after 5 years on the field, where seedlings are planted in clear-felled furrows made through otherwise undisturbed forest. Aldrex T has also been found to reduce pre-emergent rotting of kola nuts by about 50 percent.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0143, PESTS OF KOLA IN NIGERIA
S.A. ADEYEMI, (NI.091.0038)

Objective: To investigate the role of insect pests in kola productivity and establish appropriate control measures.

Approach: 1) Studies on the biology and control of the kola nut weevil. 2) Studies on the biology and control of the kola stem borer. 3) Studies on the role of insects in kola pollination.

Progress: Studies on bionomics of the kola weevil are in progress. Some control has been achieved by soaking nuts in BHC solution and by fumigation with Phosphine.

The present size of the kola tree makes control of the stem borer difficult. An insect, Torma Kolae, is suspected to be a kola pollinator.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0144, STUDIES ON YIELD IMPROVEMENT IN COFFEE
J. WILLIAMS, (NI.091.0039)

Objective: To study the yield characteristics and components of different species, varieties and clones of coffee, especially cultivars of Coffee arabica and C. canephora.

Approach: Variety trials of C. arabica and C. canephora throughout their range of cultivation and adaptation; clonal trials of superior selections from the variety trials. Studies of cyclic bearing patterns, flowering characteristics and pollen viability; properties of fruits (incidence of pea perry, cherry: parchment: hulled conversion ratios); correlations between individual components above and yield. These are to be followed by diallel crosses between superior selections.

Progress: Results so far show that of the main C. canophora (robusta) varieties, Quillou is much higher yielding than Java; both are of similar quality. Best clones of Quillou available are C36, C96, C105, and C111. High correlation exists between growth measurements (stem girth, height, etc.) up to 30 months and future cumulative yield.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0145, COFFEE AGRONOMY PROJECT
T. OYEBADE, (NI.091.0040)

Objective: To develop suitable techniques for maintaining high yielding plants in the best field condition for production.

Approach: Study of factors like shade requirements, mulching, spacing, pruning, transplanting, weed control, as well as the general physiology of the coffee plant.

Progress: The 'Common Agobio' method of pruning appears to give the best results so far. Studies have also shown that Ethrel accelerates the onset of fruit ripening at 100 ppm. and higher.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0146, USE OF GROWTH REGULATORS IN COFFEE HUSBANDRY
T. OYEBADE, (NI.091.0041)

Objective: To improve coffee berry germination, seedling growth and berry ripening by the use of growth regulators.

Approach: (1) Soaking seeds in thiourea, ethrel and gibberellic acid prior to sowing for quicker germination and more uniform seedlings with better vigour. (2) Pre-harvest spraying of mature berries with ethrel for uniform ripening.

Progress: Berries in 10-100 ppm ethrel, 1000 ppm thiourea and 100 ppm GA. before sowing resulted in better germination. Ethrel at 100-250 ppm had been found to induce uniform ripening in coffee, and to accelerate the onset of berry ripening.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0147, COFFEE NUTRITION STUDIES
T.I. OMOTOSHO, (NI.091.0042)

Objective: To study the nutrient status and suitability of the soils in most coffee growing areas as a basis for fertilizer recommendations.

Approach: NPK factorial trial to investigate the effect of fertilizers on yield of adult coffee. Use of radioisotope techniques to study the annual pattern of nutrient absoption by coffee seedlings - an aid to determine time of fertilizer application.

Progress: Calibration of the mature coffee plot for the fertilizer trial has just been completed.

SUPPORTED BY Cocoa Res. Inst. of Nigeria, Ibadan

NIGERIA

9.0148, DISEASES OF COFFEE IN NIGERIA

G. FILANI, (NI.091.0043)

Objective: To survey and study the various diseases of coffee in Nigeria.

Approach: Isolation, culturing and identification of the pathogenic fungi on coffee in various parts of the country. Fungioide screening for the control of coffee leaf rust, and seed borne diseases.

Progress: The major coffee pests and diseases have been listed and their damage described.

No recommendations for routine chemical control yet, but screening fungicides for leaf rust control is in progress.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0149, INSECT PESTS OF COFFEE IN NIGERIA

O. IDOWU, (NI.091.0044)

Objective: To survey and study the various pests of coffee in Nigeria.

Approach: Ecological studies on Epicampoptera and Leucoplema, the major leaf pests, and the coffee berry borer.

Progress: The major coffee pests have been listed and their damage described. Basic information is already available on the ecology of the major coffee pests.

No recommendations for routine chemical control yet.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0150, SELECTION AND BREEDING OF CASHEW FOR HIGH YIELD AND DESIRABLE NUT CHARACTERISTICS

V.J. JACOB, (NI.091.0045)

Objective: To make selections from genotypes already available in Nigeria and to use them in cashew improvement programme.

Approach: Studies on yield and cropping pattern of cashew populations at various locations in Nigeria so as to identify superior genotypes. Combine the selections in top crosses and partial diallel crosses.

Progress: Preliminary slections were made from cashew populations at IWO, ERUWA, and Upper Ogun in the Western State of Nigeria.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0151, MINERAL NUTRITION OF CASHEW

J.A. FALADE, (NI.091.0046)

Objective: To study the essential nutrient requirements of cashew.

Approach: Grow cashew trees in sand cultures of given nutrient status and analyse various parts of the tree for mineral elements. Describe deficiency and toxicity symptoms of the elements and study their inter- relationships.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0152, INSECT PESTS ASSOCIATED WITH CASHEW IN NIGERIA

W.E. EGUAGIE, (NI.091.0047)

Objective: To survey and assess the relative economic importance of insects on cashew.

Approach: (1) Collection, preservation and identification of insects associated with cashew in Nigeria. (2) Definition and recognition of damage caused on cashew by pest species.

Progress: About 150 species have been identified from a survey of Western and Kwara States conducted in July - October. These records represent seven orders and fifty families. Major pests at the period were Analeptes trifasciata, Helopetis sp., Selenothrips rubrocinetus, and Hyalea sp.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0153, ECONOMICS OF PRODUCTION IN TREE CROP AGRICULTURE

O. AJOBO, (NI.091.0048)

Objective: To investigate long and short term relationships between modes and level of investment, cost involved and returns realised in cocoa, kola, coffee and cashew.

Approach: (1) Design and pretest of a sampling frame and questionnaire; (2) Subsequent personal interviews based on experience gathered on (1); (3) Economic and statistical analysis and interpretation of data obtained from (2).

Progress: Planning Stage.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0154, CROP UTILIZATION PROJECT

D.B. OGUTUGA, (NI.091.0049)

Objective: To find alternative uses for cocoa, kola, cashew and their by-products.

Approach: Utilization of the fat-free cocoa powder in combination with other local foodstuffs. Utilization of cocoa sweatings, kola and cashew apple for the production of pectins, jams and wines. Use of cocoa pod husk as a constituent of livestock feed, source of ash and as compost. Development of large scale extraction procedure for caffeine and dyes from kola. Extraction of butter fat from mouldy or otherwise damaged cocoa pods for possible uses. Sample manufacture of chocolate for tropical environments.

Progress: Laboratory samples of pectins, jams, wines, ash, caffeine, dye, chocolate etc., from cocoa kolaare already available, but others are newly started.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

9.0155, SEED GARDEN RESEARCH PROJECT

V.J. JACOB, (NI.091.0050)

Objective: To ensure that the seed requirements of the country are met by developing suitable techniques for the establishment and effective utilization of seed orchards.

Approach: Studies on the flushing and flowering periodicity of cocoa and kola clones in relation to cutting production and hybrid seed production potentials. Studies on the nutritional requirements, layout and spacing of cocoa and kola clones in polyclonal seed orchards. Evaluation of polyclonal cocoa and kola seed orchards raised from rooted cuttings and buddings. Establishment of robusta coffee and cashew seed gardens to study their seed production potential.

Progress: New project, but techniques for establishing cocoa hybrid seed gardens are already available.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

INSTITUTE FOR AGRICULTURAL RESEARCH

Samaru, P.M.B. 1044, Zaria

9.0156, SORGHUM BREEDING

D.J. ANDREWS, (NI.060.0001)

Objective: Synthesis of adapted high yielding varieties and hybrids acceptable to the consumer for the various ecological zones in the Northern States of Nigeria.

Approach: Variety introduction and screening (including the World Collection), hybridization and pedigree selection, production of hybrid parents, composite breeding (using ms7) and research into problems of variety and hybrid seed production.

Progress: Release of improved local varieties (e.g. YG 5760-3-10 (Sudan Zone); C7-4-3 (Southern Guinea Zone) in major production areas from 1962 to 1970, giving gains up to 20 percent. Dwarf varieties released in Northern Guinea Zone (e.g. "Short Kaura") from 1966 showing up to 70 percent improvement over unimproved local varieties. Experimental hybrids based on adapted seed parents now in final tests (1972) have shown 25 percent improvement on the dwarf varieties.

SUPPORTED BY Ahmadu Bello University - Zaria, Nigeria

9.0157, AGRONOMIC FACTORS INFLUENCING SORGHUM PRODUCTION

E.F. BAKER, (NI.060.0002)

Objective: To determine the fertilizer requirements, effect of planting date, population level, rotation, weeding on current and new varieties of sorghum for the various ecological zones in the Northern States of Nigeria.

Approach: Fertilizer trials are being conducted both on compounds and NPK, and time of application, to either with minor element investigations. Effects of other crops and fallows on sorghum are being assessed. Population level is included as a variable in fertilizer trials as dwarf varieties require higher plant densities for maximum yields.

Progress: Levels of N and P required on local sorghum varieties, and response areas have been determined. Residual effects of P are known. Population levels and fertilizer requirements of dwarf varieties have been partly determined.

SUPPORTED BY Ahmadu Bello University - Zaria, Nigeria

9.0158, INTERCROPPING WITH SORGHUM

J.L. PALMER, (NI.060.0003)

Objective: Determination of the factors controlling sorghum yields in intercrops and potential for improvement of the system.

Approach: Evaluation of variety differences when intercropped; effect of relative crop densities and arrangements, including those suitable for improved farming techniques.

Light penetration and nutrient uptake are increased together with growth analysis (see sorghum physiology) to determine competitive effects.

Progress: Dwarf varieties grown in the northern Guinea zone, have proved advantageous over tall varieties in crop mixtures as they offer less competition, without losing yield. At good yield levels, intercropping is still advantageous compared to sole cropping with photosensitive sorghums, or double cropping.

SUPPORTED BY Ahmadu Bello University - Zaria, Nigeria

9.0159, SORGHUM CROP PROTECTION

S.B. KING, (NI.060.0004)

Objective: To determine the level of damage, mode of attack and control measures possible on pests and diseases of both the field and stored sorghum crop in the Northern States of Nigeria.

Approach: Screening World collection, special introductions and breeding material for genetic "resistance" to shootfly (Atherigona spp.), stemborer (Busseola fusca), sorghum midge, and witchweed (Striga hermontheca), and crossing superior lines into composites for recurrent selection. Studies on the identity and mode of infection by smuts, and seedling diseases. Mass rearing of stemborers. Testing general herbicides and herbicides specifically active against Striga and methods of their application. Research is proposed on the biochemical nature of resistance to Striga.

Progress: Identification of ametryne as effective against emerged Striga, and carbaryl giving stemborer control. Formation of resistant composites (1972).

SUPPORTED BY Ahmadu Bello University - Zaria, Nigeria

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE

Oyo Road, P.M.B. 5320, Ibadan

9.0160, IRRIGATION SYSTEMS INVESTIGATION - HYDROLOGIC CHARACTERIZATION OF SMALL WATERSHEDS IN THE HUMID TROPICS

E.U. NWA, (NI.810.0001)

Objectives: 1. To investigate the conditions under which a given irrigation system can be beneficially used in the Humid Tropics; and to analyze the cost-benefit ratio of each system. 2. To investigate the water requirements of various crops. 3. To study the effect of land clearing on the various components of the hydrologic cycle.

Approach: Seven irrigation systems (types) will be studied under local conditions and specifications established for their applicability. Water requirements will be investigated using lysimeter. Tropical watersheds are being instrumented to collect surface and subsurface runoff, and also soil and nutrient losses.

Progress: The experiments are being planned.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0161, PEDOLOGY PROJECT

F.R. MOORMANN, (NI.810.0002)

Objectives: 1. Study of the major soils in the forest and subhumid savanna, with emphasis on West African soils. 2. Study of actual and potential capability and limitations of major West African soils, with emphasis on S. Nigerian soils. 3. Experimental land suitability classification, through the study of production-determining land qualities on toposequences (soil and groundwater) at IITA.

Progress: All phases of the Pedology subproject are on going; first results of experimental land suitability classification are in for the 1972 growing season.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

NIGERIA

9.0162, PHYSIOLOGY OF ROOT, TUBER CROPS AND VEGETABLES

S. SADIK, (NI.810.0003)

Objective: The objective is to gain better understanding of the physiology of the above crops, particularly cassava, yams and sweet potatoes, in order to provide relevant information to other members of the program for increasing yields quantitatively and qualitatively. On- going research has dealt so far with plant increase by means of tissue culture, production of haploid plants from another culture, anatomy and morphology of yam flowers, growth analysis of cassava through a growth season, effect of canopy structure of yam and cassava on yield. We are also dealing with storage studies on yam and seed germination of cassava and yams.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0163, PEPPER IMPROVEMENT

G.F. WILSON, (NI.810.0004)

Objective: To select and develop a pepper suitable for production in the humid tropics. Collecting sources of resistance to the various diseases that limit production of these vegetables is being done. Efforts are being made to synthesize high yielding disease resistant varieties.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0164, LEAFLY AND FRUIT VEGETABLE IMPROVEMENT

G.F. WILSON, (NI.810.0005)

Objective: To select and develop vegetables suitable for production in the humid tropics. Emphasis is on tomato, okra and native tropical leaf vegetables. Collecting sources of resistance to the various diseases that limit production of these vegetables is being done. Efforts are being made to synthesize high yielding disease- resistant varieties.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0165, INCORPORATION OF LEAFLY AND FRUIT VEGETABLE AND PEPPER PRODUCTION INTO FARMING SYSTEMS

G.F. WILSON, (NI.810.0006)

Objective: To incorporate vegetable production into farming systems developed for humid tropical areas. Emphasis is on tomato, pepper, okra and native tropical leaf vegetables.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0166, VARIETAL IMPROVEMENT (BREEDING) OF GRAIN LEGUMES

K.O. RACHIE, (NI.810.0007)

Objective: To improve the production of high quality foods from appropriate leguminous plant sources in the low, humid tropics.

Approach: a) Establish breeding, selection and world germplasm evaluation nurseries. b) Evaluate for important botanical characters, disease and pest reaction, grain quality, nutritive value and other factors. c) Take notes on promising parental stocks and select promising single plants for further evaluation and crossing. d) Select elite lines from preliminary yield testing, and advance the promising and highest-yielding entries to advanced trials. e) Evaluate the most promising and highest yielding entries from advanced trials in uniform trials in cooperating countries. f) Make a formal release of the most promising genotype(s) for breeding and production purposes.

Progress: A germplasm of approximately 4,000 entries has been assembled and evaluation of the various factors is in progress. Uniform cooperative trials have been conducted in various countries.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0167, GRAIN LEGUME PHYSIOLOGICAL INVESTIGATIONS

H.C. WIEN, (NI.810.0008)

Objective: 1. Plant growth analysis of soybean and cowpea at 3 plant spacings with 2 varieties of each species. Leaf area, total dry weight and dry weight components are harvested every two weeks through the growing season. 1 planting just completed, another planned for 1973. 2. Evaluation of physiological characteristics in cowpea germplasm collection (ongoing investigation - one growing season completed). 3. Photoperiod sensitivity of cowpea and soybean genotypes - to be started in December, 1972. 4. Drought tolerance and drought avoidance of cowpea and soybean - to be started December, 1972. 5. Photosynthesis and respiration measurements on attached leaves of cowpeas under field conditions - in cooperation with U. of Nottingham, to be started April, 1973. 6. Pollen germination of cowpea - investigations to find an artificial medium for cowpea pollen germination and growth are now underway.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0168, GRAIN LEGUME DISEASE AND NEMATODE INVESTIGATIONS

F.E. CAVENESS, (NI.810.0009)

Objective: The identification and control of the major diseases of cowpea and soybean.

Approach: Major emphasis on identification and utilization of host plant resistance through the use of field disease nurseries in close cooperation with plant breeders. Disease incidence/yield loss studies through disease simulation, chemical control and manipulation of epidemics.

Progress: World collection of cowpea being screened for susceptibility to eight diseases. Yield loss studies made for Anthracnose and Cercospora diseases in cowpea.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0169, INSECTICIDE EVALUATIONS ON SOYBEANS - (GLYCINE MAX)

W.K. WHITNEY, (NI.810.0010)

Objective: Field-plot testing for insect control, phytotoxicity, and effects on yield.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0170, GRAIN LEGUME ENTOMOLOGICAL INVESTIGATIONS

W.K. WHITNEY, (NI.810.0011)

Field studies on the relative susceptibility of several grain legumes (e.g. Cajanus cajan, Canavalia ensiformis, Glycine max, Phaseolus lunatus, P. vulgaris, Psophacarpus tetragonolobus, Vigna aurens, V. mungo, V. radiatus, V. umbellata, V. unguicalate and some wild and weedy species of Vigna) to major insect pests.

Effects of insect pests are assessed in terms of damage to plants, and yield components are evaluated relative to damage.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0171, PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA
W.K. WHITNEY, (NI.810.0012)

Objective: 1. Screening world collection of germplasm for resistance to insect pests (thrips, leaf beetles, Hemiptera and pod borers). 2. Insecticide evaluations (seed dressings, soil systemics and foliar sprays). Insect control, phytotoxicity and yields assessed in field trials. 3. Damage and yield loss studies related to major insect pests. 4. Cultural control studies - e.g. effects of intercropping and of weeds of pest incidence. 5. Observations on parasites and predators of cowpea pests.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0172, HARVESTING IN RELATION TO COWPEA YIELDS
D. NANGJU, (NI.810.0013)

Objective: To determine the optimum time and number of harvests for some indeterminate types of cowpeas.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0173, COMPARATIVE EFFECTS OF TILLAGE ON SOYBEANS
D. NANGJU, (NI.810.0014)

Objective: To compare the growth and yield of soybeans under conventional tillage, minimum tillage and no tillage.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0174, COWPEA AND SOYBEAN FERTILIZATION
D. NANGJU, (NI.810.0015)

Objective: To study the response of cowpeas and soybeans to varying levels of nitrogen, phosphorus, potassium and some minor elements at different soils.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0175, PLANT DENSITY ON COWPEAS AND SOYBEANS
D. NANGJU, (NI.810.0016)

Objective: To determine optimum row-spacings and plant populations of several cowpeas and soybeans differing in their growth habits, leaf size and shape and plant height at different seasons and fertilizer levels.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0176, GRAIN LEGUME PROTECTION
D. NANGJU, (NI.810.0017)

Objective: To study the use of insecticides and fungicides as seed pelleting materials.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0177, BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES
R.A. LUSE, (NI.810.0018)

Objectives: To participate in efforts to improve the nutritional qualities of edible tropical grain legumes; and to study the biochemical sequence of events in plant growth processes in large crops.

Approaches: 1. The following constituents will be screened in genetic stocks in support of plant improvement activities: a) Oil and protein - NMR and infra-red reflectance characteristics. b) Specific amino acids like methionine and cystine (and possibly tryptophan) using quick sulfur analysis; or colorimetric tests. c) Total amino acid spectrum - auto-analyzer will be available. d) Toxic principles including trypsin inhibitor, hemaglutinins, flatus factors and other by GLC or other means. e) Other proximate principles such as carbohydrates, vitamins, fatty acids, HCN and other alkaloids by appropriate means. f) Organoleptic and cooking qualities will be tested as appropriate. 2. Investigations in collaboration with plant physiologist, agronomist, pathologist and entomologist will relate to plant growth processes, nutrient uptake, pest resistance systems and other topics of mutual interest.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0178, SOIL CHEMISTRY
A.S. JUO, (NI.810.0019)

The major objective of soil chemistry research at IITA is to investigate the basic chemical properties of tropical soils and their relation to plant nutrition and crop growth. The following approaches have been made: 1. The study of surface and charge properties of tropical soils with particular references to iron, aluminum oxides and silica, their interaction with soil organic matter and with agricultural chemicals. 2. Field and laboratory investigations to compare the changes in chemical and mineralogical properties of tropical soils under bush fallow and continuous cropping; and 3. The effect of soil chemical environment and crop root development, with particular emphasis on varietal tolerance to Al toxicity in acid on tropical soils.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0179, SOIL MICROBIOLOGY
A. AYANABA, (NI.810.0020)

Objectives: (a) To study the transformations of indigenous and amended organic materials, biological activity and nutrient (N,C,S,P) release under different farming systems (traditional, modern, intergrades). (b) Collect, identify and test cowpea and soybean rhizobia against promising legumes at IITA; will also assess nitrogenase activity (by acetylene reduction technique) of tropical legumes and non- legumes. Over 100 bacteria have been isolated from nodules of Nigerian legumes for testing. (c) To study microbial degradation of pesticides and the effect of pesticides on non-target species such as nitrogen fixers, ammonifiers and nitrifiers. Emphasis will be placed on the fungicide benlate and some of the chlorinated hydrocarbon insecticides and herbicides. (d) Fertilizer studies will be on urea and sulfur- coated urea as slow release fertilizers. Effect of soil temperature and type on nitrogen release will be tested by the soil perfusion technique and also with soil cores.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0180, AGRONOMY (SYSTEMS)
J.C. MOOMAW, (NI.810.0021)

OBJECTIVES: 1. To investigate the management factors and cultural practices associated with farming systems in the humid tropics. 2. To conduct research on agronomic factors and their food crop production consequences at selected levels of technology associated with the farming systems practised in the humid tropics. 3. To do research and assist other scientists in the systems analytic approach to food crop production on the various levels of agricultural technology.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

NIGERIA

9.0181, IMPROVEMENT OF CEREALS PRODUCTION AND MARKETING IN THE CENTRAL AFRICAN REGION

B.M. JELLEMA, (NI.810.0022)

OBJECTIVES: To develop a proposal for a coordinated approach to the improvement of production and marketing of cereals in Cameroon, Chad, CAR and Gabon.

PREPARATORY STAGE: Economist will take up residence in Yaounde in February 1973.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0182, CASSAVA BREEDING

S.K. HAHN, (NI.810.0023)

The research objectives of cassava breeding will be to produce multiple resistance by cassava mosaic, bacterial wilt (Xanthomonas manihotis) and Cercospora spp. and to produce promising varieties with higher yield in terms of dry matter per unit time and area.

Establish breeding and evaluation nurseries, raising about 100,000 seedlings from hybridization and introduction. Evaluate these, with major emphasis on resistance to the above mentioned diseases and evaluate for HCN content, starch content and quality and yield potential.

About 12,000 plants from seed were produced and evaluated for resistance to diseases and insects. Several hundred plants having high resistance to cassava mosaic disease have been produced. About 100,000 hybrid seeds for 300 cross combinations were produced.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0183, SWEET POTATO BREEDING

S.K. HAHN, (NI.810.0024)

Major emphasis will be placed on high yield, in terms of dry matter per unit time and area, resistance to sweet potato weevil and high storability.

Establish breeding and evaluation nurseries, raising about 40,000 seedlings from hybridization and introduction.

Evaluate these for root characters, dry matter percentage, resistance to weevil, storability and yield potential.

High yielding clones have been produced.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0184, MECHANIZATION OF TROPICAL AGRICULTURE

W.F. LALOR, (NI.810.0025)

OBJECTIVE: To find ways in which mechanization can be profitably used in tropical agriculture.

APPROACH: It is assumed that the mechanization technology now used or formerly used in developed nations can be adapted to fill most of the needs. Farming systems will be studied to determine how mechanization can be usefully applied. Symbolic models will be synthesized and tested on actual farms at IITA and elsewhere. Where no technology exists, design and development and research necessary for these functions will be undertaken. Research to improve tillage and traction equipment and methods will be undertaken.

PROGRESS: Project is in initial stages. A survey was done in West Africa to identify the priority requirements and project is oriented toward these priorities.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0185, SOIL CONSERVING CROPS

L.V. CROWDER, (NI.810.0026)

OBJECTIVES: 1) To collect, evaluate, select and increase seeds of forage type grasses and legumes suitable for soil conservation and soil improvement. 2) About 75 species each of grasses and legumes were accumulated and sown in September, 1971. The more promising in terms of early rapid growth and ground cover, weed competition, tolerance to diseases and insects, flowering and seed production (or ease of vegetative propagation), drought tolerance, persistence and regeneration of growth after the dry season were chosen for additional evaluation by sowing in April and in August 1972. Seeds of some were collected during the dry season of 1972. 3) The following were selected as having the greatest potential for more detailed study in cropping sequences or for soil conservation on highly erodible land: Grasses - Pennisetum purpureum, Panicum maximum, Cynodon nlemfuensis (Cynodon IB.8), C. dactylon, Melinis minutiflora, Brachiaria ruziziensis, Paspalum notatum. Legumes - Stylosanthes gracilis, Centrosema pubescens, Glycine wightii, Calopogonium mucunoides, Pueraria phaseoloides, Cajanus cajan, Leucaena leucocephala.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0186, YAM BREEDING

S.K. HAHN, (NI.810.0027)

OBJECTIVES: 1. Assemble large scale germplasm from the West African countries, with major emphasis on White Yam (D. rotundata), Yellow Yam (D. cayenensis) and (D. dumetorum). 2. Conduct preliminary trials for the selection of 500 clones and assess yield potential resistance to soil borne diseases, nematodes and insects, root characters, dry matter percentage, starch content and quality, protein content, storability and propagation characteristics. 3. Select the most promising and high yielding clones and put forward to advanced yield trials.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0187, CASSAVA ENTOMOLOGY

S.R. SINGH, (NI.810.0028)

OBJECTIVES: 1. Study of insect pests of cassava and identification of damage due to various insects. 2. Field observations on varietal resistance in cassava germplasm and breeding materials to spider mites, mealy bugs and grasshoppers. 3. In cooperation with plant pathologist, develop techniques for screening cassava mosaic under both field and laboratory conditions. 4. Cassava mosaic-vector relationship and host- plants.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0188, SWEET POTATO ENTOMOLOGY

S.R. SINGH, (NI.810.0029)

OBJECTIVES: 1. Study of insects and vectors of sweet potato and their alternative hosts. 2. Field screening of sweet potato germplasm against sweet potato weevil and identification of resistant cultivars. 3. Chemical control of sweet potato weevil, using different insecticides - easy method of insecticide application and estimation of cost benefit ratio.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0189, YAMS ENTOMOLOGY

S.R. SINGH, (NI.810.0030)

OBJECTIVE: Identification and control of field and storage pests of yams.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0190, CASSAVA PATHOLOGY
E. TERRY, (NI.810.0031)

OBJECTIVES: 1. Identification of resistance in germplasm and breeding materials to cassava mosaic, bacterial wilt and Cercospora spp. 2. Develop quick and efficient field and laboratory screening techniques for the resistance to cassava mosaic, bacterial wilt, and Cercospora spp. 3. Host pathogen relationships of cassava mosaic, bacterial wilt and Cercospora spp. The effect of environment and the stability of the reaction under different ecological conditions. 4. Assess yield loss due to cassava mosaic, bacterial wilt, and Cercospora spp. 5. Cassava mosaic, vector, and plant relationship and nature of its transmission, in cooperation with entomologist. 6. Methods and economics of control of bacterial wilt.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0191, SWEET POTATO PATHOLOGY
E. TERRY, (NI.810.0032)

OBJECTIVES: 1. Evaluate germplasm and breeding materials for the resistance to viruses. 2. Identification and control of diseases of field and storage root rot.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

9.0192, YAMS PATHOLOGY
E. TERRY, (NI.810.0033)

OBJECTIVES: 1. Evaluate germplasm and breeding materials for resistance to, and develop methods of control for, shoe-string disease, die-back, Cercospora spp. and some soil-borne diseases and nematodes. 2. Identification and control of storage rot diseases. 3. Assess yield loss due to shoe-string, die-back, Cercospora and some soil borne diseases and nematodes.

SUPPORTED BY Internat. Inst. of Trop. Agr. - Nigeria

ISOTOPE LABORATORY OF THE DEPARTMENT OF AGRONOMY, UNIV. OF IBADAN

Ibadan

9.0193, WATER USE EFFICIENCY OF MAIZE IN SOME NIGERIAN SOILS
O. BABALOLA, (NI.831.0001)

The project aims at developing improved means for controlling the dynamics of soil water in the field, as a basis for the better use of soil and water resources in agriculture.

The implementation of this project would contribute to increasing maize production as a result of improved water management techniques which lead to reducing water losses and a more efficient water use.

Two soil series, namely Egbeda and Apomu, which have contrasting characteristics will be investigated. The physical properties of the soil profiles will be studied with special emphasis on determining the hydraulic conductivity as a function of moisture content with the aid of tensiometers and a neutron moisture meter. Using radioactive phosphorus, as assessment will be made of the extent to which the soil properties and soil moisture distribution effect the root system development of maize. The effect of certain cultural practices on the evapotranspiration by maize under well defined climatic conditions will be investigated.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.
Internat. Atomic Energy Agency - Austria

LAKE CHAD RESEARCH STATION

P.O. Box 227, Maiduguri

9.0194, FISHING GEAR TRIALS
M.A. AFINOWI, (NI.191.0001)

Objective: On gear trials our objective is to compare the efficiency of coloured and uncoloured nylon gillnets.

SUPPORTED BY Federal Dept. of Fisheries - Nigeria

9.0195, FISH POPULATION STUDIES
M.A. AFINOWI, (NI.191.0002)

Objective: Our objective is to study seasonal and long-term changes in the abundance of fish and to observe the size and specific composition of catches.

SUPPORTED BY Federal Dept. of Fisheries - Nigeria

9.0196, FISH MIGRATION STUDIES
M.A. AFINOWI, (NI.191.0003)

Objective: To study the migration pattern of Alestes baremoze and A. dentex.

SUPPORTED BY Federal Dept. of Fisheries - Nigeria

MAMBILLA SUBSTATION

North Eastern State

9.0197, COLLECTION, CHARACTERIZATION AND EVALUATION OF COFFEE GERMPLASM
J. WILLIAMS, (NI.094.0001)

Objective: To catalogue and evaluate the existing C. arabica germplasm and to widen our gene base with introductions from Ethiopia, Ivory Coast, India etc.

Approach: Characters such as adaptability to our environment, fruiting habits, yield potential, resistance to disease etc. will be scored for each introduced variety and selections will be made of the source materials for future improvement.

Progress: 112 varieties of C. arabica are now well established on the Mambilla Plateau Substation. 11 of these have been outstanding but final selection will be made in 3 years' time, i.e. after 5 years of fruiting.

SUPPORTED BY Cocoa Res. Inst. of Nigeria - Ibadan

NIGERIA

MOKWA AGRICULTURAL RESEARCH STATION

Mokwa, North Eastern State

9.0198, MAIZE HERBICIDE TRIAL

A. WILLIAMS, (NI.136.0001)

National Network Project, see NI.131.0078. (9.0276)

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

MOOR PLANTATION

P.M.B. 5042, Ibadan

9.0199, MAIZE HERBICIDE TRIAL

A. WILLIAMS, (NI.131.0001)

OBJECTIVE: The screening of new herbicides for weed control in maize.

APPROACH: Two established and tested herbicides are being used in addition to other four promising and newly-introduced ones. All the new entries will be compared with Simazine and Gesaprim: two crops of maize, early and late seasons, would be planted.

PROGRESS: Simazine and Gesaprim have proved very successful and are being recommended for use to control weeds in maize.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0200, NUTRIENT DETERMINATION IN THE MATURE SEEDS OF DIFFERENT VARIETIES OF BEANS

A.F. TELLA, (NI.131.0002)

Estimation of different classes of proteins (Albumins, globulins, glutelins and gliadins) by extraction and spectrophotometric methods.

Electrophoresis of the different protein fractions in order to study their components.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0201, TO DETERMINE THE CRUDE PROTEIN LYSINE AND TRYPTOPHAN CONTENT OF THE RECOMMENDED MAIZE VARIETIES

A.F. TELLA, (NI.131.0003)

Determination of crude protein, lysine and tryptophan content of recommended maize varieties in order to assess their quality.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0202, TO COMPARE THE NUTRIENT CONTENT OF PARBOILED RICE THROUGH VARIOUS STAGES OF PROCESSING

A.F. TELLA, (NI.131.0004)

To find out the differences in the nutrient content of the different components of rice through the various stages of processing.

Estimation of proteins in different components of the grain.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0203, MAIZE POPULATION STUDIES

A. WILLIAMS, (NI.131.0005)

OBJECTIVE: To study the effects of different plant populations on the growth and grain yield of recommended maize varieties.

APPROACH: Systematic spacing design using populations from 10.000 to 35.000 plants per acre, three replications and three types of plant arrangements: rectangularities 3:1, 2:1 and 1:1.

PROGRESS: Late 1970 and early season 1971 trials were failures due to drought. 1972 trials put 35.000 plants per acre possible and good as regards yield and growth. Other results are being compiled.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0204, HERBICIDE SCREENING

A. WILLIAMS, (NI.131.0006)

OBJECTIVE: To compare the effects of different post-emergent herbicides in the control of weeds in upland rice fields and growth and yield of crop.

APPROACH: A randomized block design with six replications. Observation on species of weeds not controlled and degree of control achieved, by weight (fresh and dry). The project continues.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0205, ECONOMICS OF RICE PRODUCTION IN SELECTED AREAS OF NIGERIA

A. ONASANYA, (NI.131.0007)

OBJECTIVE: To determine the cost of producing rice under different methods of cultivation in different parts of the country so as to determine the most economical way of producing rice.

APPROACH: Subdivision of rice into upland and swamp rice. Location of rice producing areas of the country. Use of questionnaire to cost inputs and outputs of local rice. Farms investigation begins in rice producing areas of Western State on upland rice with the hope of extending it to other parts of the country and also to swamp rice.

PROGRESS: Questionnaire already made and in May 1973 field investigation by use of questionnaires with local rice producers begins in selected areas of Western State.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0206, EVALUATION OF NUTRITIVE VALUE OF SOME LOCAL AND INTRODUCED RICE

J.O. OMUETI, (NI.131.0008)

Some local varieties of rice could be quite rich in some desirable nutrients as can be seen from a chemical analysis and this could act as a guide to breeders in the selection of parent materials for further work.

OBJECTIVE: Determination of the total protein, different classes of proteins, the carbohydrate constituents - starch, sugars, vitamins and minerals - will be carried out - both qualitatively and quantitatively.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0207, EVALUATION OF THE NUTRITIVE QUALITY OF BEANS

J.O. OMUETI, (NI.131.0009)

The objectives of the project are: (a) The assessment of utilisable energy and (b) The assessment of protein efficiency of the recommended varieties of beans from the research station.

A determination of energy balance in rats after feeding and weight gain is taken and compared with the apparent energy content in the bean as fed.

Determination of growth rate and protein efficiency of these varieties acting as the main source of protein to the rat is made.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0208, THE EFFECT OF GRASS - LEGUME MIXTURES ON HERBAGE PRODUCTION AND CHEMICAL COMPOSITION AS COMPARED WITH APPLICATION OF NITROGEN PERT

U.I. OJI, (NI.131.0010)

It may be cheaper to obtain nitrogen from a legume than from the chemical source under our conditions. Hence efforts are being made to find which legume combines best with Cynodon IB8 - one of the best grasses for the Southern Nigeria. There are five treatments with 3 replications as follows: (a) Control plot of the pure unfertilized herbage, (b) Herbage fertilized with nitrogen fertilizer (75 lb.N. per acre), (c) Herbage plus Stylosanthes gracilis, (d) Herbage plus Phaseolus atropurpareus, (e) Herbage plus Stylosanthes gracilis. The herbage will be harvested at two-weekly intervals after full establishment three times and quantity noted and then the material analyzed for crude protein, ash, fibre and other extract.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0209, SEED RATE TRIAL WITH UPLAND RICE

A. WILLIAMS, (NI.131.0011)

OBJECTIVE: To compare the establishment and yield of OS 6 when drilled by machine at 6 seed rates.

APPROACH: Seed rates of 10 - 60 lb/ac.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0210, THE COLLECTION OF INDIGENOUS AND THE INTRODUCTION OF EXOTIC CASSAVA VARIETIES FOR THE BREEDING OF CASSAVA

U.U. EBONG, (NI.131.0012)

OBJECTIVE: To select outstanding varieties from the cassava national collection for the Breeding Programme.

APPROACH: Mass selection on individual plant basis of disease tolerant and high yielding varieties.

PROGRESS: Variety 53101 recommended to farmers for cultivation and use.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0211, INVESTIGATIONS OF METHODS OF BREAKING CASSAVA SEED DORMANCY AND THE EFFECT OF AGE ON CASSAVA SEED GERMINATION

E.E. UMANAH, (NI.131.0013)

OBJECTIVE: To compare methods of breaking seed dormancy of cassava and to investigate the effect of age on seed germination.

APPROACH: Collection of outcrossed seeds of various cassava varieties and the use of scarification, and heat treatments on the seeds.

PROGRESS: Wet heat treatment of seeds at 35 degrees C for two days before planting recommended.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0212, THE PRODUCTION OF MOSAIC RESISTANT-/TOLERANT, HIGH YIELDING CONSUMER ACCEPTABLE CASSAVA VARIETIES

U.U. EBONG, (NI.131.0014)

OBJECTIVE: To produce mosaic resistant, high yielding, consumer acceptable cassava varieties with wide adaptability.

APPROACH: Hand pollinations of flowers of selected varieties and species; pedigree selections and back cross methods.

PROGRESS: Varieties 60444, 60447 and 60506 recommended to farmers for cultivation and use.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0213, THE ESTIMATION OF STARCH, DRY MATTER CONTENT AND HYDROGEN CYANIDE CONTENTS OF CASSAVA VARIETIES

E.E. UMANAH, (NI.131.0015)

OBJECTIVE: To estimate starch, dry matter contents and hydrogen cyanide contents of tubers of cassava varieties selected for high yields prior to final recommendation.

APPROACH: The determination of starch by specific gravity, technique and cyanide by alkaline titration.

PROGRESS: Method standardized for routine use.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0214, A MICROBIOLOGICAL APPROACH TO GRASS-/LEGUME COMPATIBILITY STUDIES

S.D. AGBOOLA, (NI.131.0016)

OBJECTIVE: To determine the efficiency of different pasture legumes in fixing nitrogen and their suitability for inclusion in grass/legume mixtures.

APPROACH: Involves isolating effective strains of Rhizobium with a view to inoculating legume seeds before planting in grass/legume mixtures.

PROGRESS: Highly effective Rhizobium strains for Centrosema, Pueraria, Stylosanthes, and Calopogonium, have been obtained, which increased both the total dry matter and crude protein by more than four times in each case as compared with control plants.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0215, STUDIES ON THE BACTERIAL LEAF BLIGHT OF COWPEA (VIGNA UNGUICULATA (L) WALP)

S.D. AGBOOLA, (NI.131.0017)

OBJECTIVE: Biology, distribution and control of the bacterial leaf blight of cowpea caused by Xanthomonas phaseoli.

APPROACH: (a) Survey of all cowpea-growing areas of Nigeria to assess distribution, (b) pathogenicity tests, (c) epidemiological studies, (d) possible control measures.

PROGRESS: Causal organism isolated and identified. Distribution mainly in the Southern parts of the country, and more severe in early season crop than in late season crop. Infection limited to patches in a field. Disease appears transmitted by insects mainly flies.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0216, THE EFFECT OF HERBICIDES ON RHIZOBIUM ACTIVITIES IN THE SOIL

S.D. AGBOOLA, (NI.131.0018)

OBJECTIVE: To study the influence of herbicides on cowpea modulation and nitrogen fixation.

APPROACH: Laboratory and greenhouse studies involving application of herbicides at field rates and studying their effects on the cowpea/Rhizobium symbiosis.

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PROGRESS: In spite of the fact that Rhizobium was quite tolerant of very high doses of Simazine, Preforan and Patoran saprophytically in petri dishes, these herbicides suppressed nodulation in potted plants to varying degrees. The basis of this suppression is under investigation.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0217, BIOLOGICAL CONTROL OF THE BROWN LEAF SPOT DISEASE OF RICE USING ORGANISMS ANTAGONISTIC TO THE PATHOGEN

S.D. AGBOOLA, (NI.131.0019)

OBJECTIVE: To study the antagonism between soil bacteria and Helminthosporium oryzae with a view to the possibility of biologically controlling the brown leaf spot disease of rice.

APPROACH: 1st stage: Isolation of both sets of organisms from the soil and diseased rice and testing the degree of antagonism under laboratory conditions. 2nd stage: Seed inoculation/-dressing with cultures of antagonistic bacteria before planting in the field.

PROGRESS: Bacillus cereus var mycoides and two other bacteria have been isolated and shown to be highly antagonistic to H. oryzae. These are being used for the 2nd stage studies.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0218, A STUDY OF THE CONTRIBUTION OF FIXED NITROGEN TO THE NUTRITION OF COWPEA (VIGNA UNGUICULATA)

S.D. AGBOOLA, (NI.131.0020)

OBJECTIVE: To study the factors affecting the effective symbioses of Rhizobium and Cowpea (Vigna unguiculata).

APPROACH: Laboratory and greenhouse inoculation studies involving dry matter determinations, distribution of fixed nitrogen within the plant (from the vegetative to the flowering and fruiting stages), and finally the proportion of fixed nitrogen appearing in the dry beans.

PROGRESS: The nodulation characteristics of the various cowpea varieties and factors affecting them are under study. Results so far have indicated that effective symbiosis between the cowpea and Rhizobium depends on external and internal factors, all of which have to be taken into account in establishing the contribution of fixed nitrogen to the nitrogen nutrition of the plant.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0219, TO STUDY THE MICROBIAL CONTRIBUTION TO THE NITROGEN ECONOMY OF FALLOWS

S.D. AGBOOLA, (NI.131.0021)

OBJECTIVE: Nitrification studies under the various systems of grassland management.

APPROACH: Soils were sampled under different fallows and nitrification rate studies of the soil perfusion technique.

PROGRESS: Nitrification is generally higher under legumes than grasses. Stylosanthes is an exception to this. The process is not always suppressed in grasslands, as is the general belief, since very high rates were recorded under Panicum maximum. This phenomenon has been tied up with the release of nitrogen to the soil by the legume partner in grass/legume mixtures.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0220, STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA)

S.D. AGBOOLA, (NI.131.0022)

OBJECTIVE: Studies on the bacterial wilt of cassava caused by Xanthomonos manihoti.

APPROACH: 1. National survey in Nigeria - 2. Survey in neighboring African countries - pathogenicity tests, - epidemiological studies.

PROGESS: This study is in conjunction with the IITA, Ibadan. These are reports of occurence from Sierra Leon, Congo Kinsasha, and Nigeria. Causal organism isolated and identified after adequate pathogenicity tests. Transmission likely by insects, and infected cuttings. First report in Nigeria and the other countries. Only other place where it had been reported was Brazil.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0221, STUDIES ON THE BACTERIAL WILTS OF SOLANACEOUS VEGETABLES

S.D. AGBOOLA, (NI.131.0023)

OBJECTIVE: Studies on the bacterial wilts of solanaceous vegetables caused by Pseudomonas solanacearum.

APPROACH: (a) National survey of occurence and severity, (b) Pathogenicity tests including host range studies, (c) Epidemiology, (d) control measures.

PROGRESS: Newly initiated program.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0222, CLASSIFICATION OF BEAN (COWPEA) VARIETIES INTO SUB-SPECIES AND GROUPS

U.U. EBONG, (NI.131.0024)

OBJECTIVE: To classify bean (cowpea) varieties according to the key developed for the Nigerian Grain Legume Gene Bank.

APPROACH: Morphological observations will be recorded on individual plants. The varieties will be planted in single row plots.

PROGRESS: A field key has been published and the bean varieties are classified according to the key.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0223, SELECTION OF BEAN (COWPEA) VARIETIES WITH DESIRABLE AGRONOMIC AND ECONOMIC CHARACTERS

U.U. EBONG, (NI.131.0025)

OBJECTIVE: To select plants with combination of desirable characters and breed improved population for release to state breeders and to farmers.

PROGRESS: Some erect growing varieties have been selected for inclusion in the hybridization program. A variety, Dinner, has been recommended for eating green. Field trials of elite varieties are in progress.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0224, ZONAL BEAN (COWPEA) VARIETY TRIAL

U.U. EBONG, (NI.131.0026)

OBJECTIVE: To determine, with the cooperation of the extension staff of the State Ministries, the average dry bean yields of the breeders' most promising bean (cowpea) varieties in the different environmental conditions in Nigeria.

APPROACH: Randomized block design with 4 replications.

PROGRESS: Some varieties have been recommended.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0225, PRODUCTION OF BEAN (COWPEA) HYBRIDS
U.U. EBONG, (NI.131.0027)

OBJECTIVE: To produce bean (Cowpea) hybrids which combine photoperiodic neutrality, earliness, erect and semi-erect growth habits, white, rough or cracked and brown, rough or cracked testa with high grain yields.

APPROACH: Artificial pollination in screened houses to be followed by field planting of hybrids for selection of desirable progenies.

PROGRESS: Crossed seeds have been produced. Production of the various generations is to commence soon.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0226, OBSERVATION OF OTHER EDIBLE LEGUMES (EXCEPT BEANS) UNDER IBADAN CONDITIONS
U.U. EBONG, (NI.131.0028)

OBJECTIVE: To record the agronomic and economic characters of all edible legumes except beans (cowpea) which are presently maintained in the Nigerian Grain Legume Gene Bank.

APPROACH: Single row plots with replicated controls.

PROGRESS: Data on some agronomic and economic characters for some varieties of soya bean, lima beans, bambara groundnuts, yam beans, French beans, green and yellowgram, gurd (cluster) beans, Dolichos lab- lab have been collected.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0227, GENETIC VARIATIONS IN SOYA BEANS
U.U. EBONG, (NI.131.0029)

OBJECTIVE: To determine the genetic variations in the important agronomic and economic characters of soys beans under Ibadan conditions.

APPROACH: The varieties of soya beans will be planted in four replications and scoring for the characters will be on 20 individual plants per replication for each variety. Heritabilities of the characters will be assessed at the end of 3 years.

PROGRESS: Data on first year planting have been collected.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0228, HYBRIDIZATION METHOD FOR SOYA BEANS
U.U. EBONG, (NI.131.0030)

OBJECTIVE: To develop efficient hybridization method for soya beans.

APPROACH: Attempts will be made to make artificial pollination by conventional methods.

PROGRESS: Preliminary studies are nearing completion on the technique of artificial pollination in soya beans.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0229, SWEET POTATOES (IPOMEA BATATAS) BREEDING
V.A. AZIH, (NI.131.0031)

OBJECTIVE: To breed high yielding lines of sweet potatoes adapted to different ecological zones and to local preferences within Nigeria.

APPROACH: Statistical assessment of local varieties, hybrids and introduced materials in zonal trials.

PROGRESS: The breeding program has been highly adversely affected by disease, insect and other agronomic problems associated with this crop, but an Acc. 2342 has been recommended in the Eastern States.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0230, YAM (DISCOREA SPP.) VARIETIES ASSESSMENT AND SELECTION FOR NIGERIA
V.A. AZIH, (NI.131.0032)

OBJECTIVE: To select most suitable yam varieties for important yam-producing areas within the yam ecological zones in Nigeria.

APPROACH: Assessment of tuber yield and other desirable agronomic and food qualities of all collections of local and introduced cultivars of yams in zonal trials within Nigeria, followed by distribution of recommended cultivars.

PROGRESS: Large collections of cultivars have been made and are being recommended for various zones.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0231, EVALUATION OF SELECTION METHODS FOR MAIZE
K.R. RAGHUMATHAN, (NI.131.0033)

In the existing maize improvement programs recurrent selection methods are widely used all over the world. With the initiation of composite populations it was thought necessary to assess and identify the most suitable method of recurrent selection method in producing improved synthetic varieties. Three methods are under consideration and the progenies obtained through three years of selection are being evaluated. Besides identifying the most efficient method the progenies thus obtained showing promise would be recommended to farmers.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0232, PRODUCTION OF WHITE FLOURY MAIZE VARIETIES FOR HUMAN CONSUMPTION
K.R. RAGHUMATHAN, (NI.131.0034)

White floury maize varieties are generally preferred for human consumption by way of dry grain food preparations. Attempt is being made to evolve high yielding maize varieties from composite breeding populations by recurrent selection methods. Over the last three years a few cycles of improved progenies have been obtained. These are being evaluated with a view to recommend to the farmers any of the outstanding progenies.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0233, PRODUCTION OF SHORT STEMMED HIGH YIELDING ACCEPTABLE MAIZE VARIETIES
K.R. RAGHUMATHAN, (NI.131.0035)

Incidence of high rate of lodging has been a bottleneck in maximizing the grain yield in maize. An attempt is being made to convert the recommended tall growing maize varieties into short stemmed high yielding ones by introducing the gene responsible for brachytic plant types.

Plant progenies have been obtained through crossing and backcrossing between the recurrent and donor parents. These progenies are being evaluated in comparison to their parent materials; after which such improved versions would be distributed to farmers in place of the existing tall and lodging maize varieties.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0234, NATIONAL ZONAL MAIZE VARIETY TRIALS
A.B. OBILANA, (NI.131.0036)

OBJECTIVE: To determine with the cooperation of the Extension staff of the State Ministries the average grain yields of the most promising breeders' materials in the different ecological zones in Nigeria.

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Breeders' materials entered in these trials are agreed upon at the annual Maize Breeders' Meeting (Comprising Maize Breeders from all Nigerian and some International Institutes, Departments and Universities). Entries are retained in these trials for at least 2 years in comparison with several local varieties and other adapted maize materials. After the years of tests, the best performing variety (ies) is then released to the State Ministries of Agriculture and farmers. Since its inception, varieties released include: NS-I; NS-S; H-503; H- 507; DIACOL-VIS 3 (1969); BULK-3 (1971).

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0235, STUDY AND IMPROVEMENT OF LOCAL MAIZE VARIETIES

A.B. OBILANA, (NI.131.0037)

OBJECTIVE: The object is to collect, observe and improve by chosen methods, the available local maize materials from the different maize ecologic zones for eventual release to other breeders and for farmers use.

APPROACH: The several local maize varieties are being collected from the different zonal sites for increase (by sib-mating), observation on their characteristics and storage in the cold store.

PROGRESS: Improvement of the best local varieties per se has been initiated using recurrent selection procedures. The selected, highly performing lines would either be bulked (by diallel crossing method) to farm synthetics or put in crosses with other selected introduced cultivars for further improvement.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0236, RECURRENT SELECTION IN A NIGERIAN WHITE FLOURY COMPOSITE

A.B. OBILANA, (NI.131.0038)

The aim is to subject the Nigerian Composite C (N.C.C.) to cycles of S-1 selection toward the continuous production of required synthetics.

The original composite population (Co) was planted for selfing in the early season. Yield trial of the S-1 lines follows in the next early season.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0237, IDENTIFICATION OF RACES OF PYRICULARIA ORYZAE

V.A. AWODERU, (NI.131.0039)

To identify races of P. Oryzae virulent to promising Nigerian rice varieties and to select rice varieties resistant to them.

This involves the inoculations of a set of differential rice varieties with conidial isolates of P. oryzae in the greenhouse.

Eleven races of P. Oryzae have actually been identified. Two of these were found to be virulent to these differential varieties.

Eleven international races were also identified in Nigeria.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0238, DIURNAL AND SEASONAL PERIODICITY OF PYRICULARIA SPORES IN AIR

V.A. AWODERU, (NI.131.0040)

To determine the variation in the spore population of Pyricularia in the air in relation to the incidence of the rice blast disease on a rice field.

Daily sampling of the air using the Hirst Spore Trap, simultaneously with sequential planting of some susceptible rice variety. Climatic factors were also recorded to be able to correlate, spore populations in air, blast disease incidence with climatic factors.

It has been established that blast disease incidence and spore populations in the air is favored by low temperature (20-28 degrees), high humidity (90-100%) and high moisture.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0239, SELECTION OF RICE VARIETIES FOR RESISTANCE TO THE RICE BLAST DISEASE (PYRICULARIA ORYZAE)

V.A. AWODERU, (NI.131.0041)

To screen all the varieties in the variety collection for resistance (seedling and mature blast resistance) to the Blast Disease (P. Oryzae). (1) Selection in the internation uniform Blast nurseries - exposes rice varieties to natural infection, (2) Greenhouse artificial inoculation tests.

A number of Resistant Varieties have been identified. Among them are Tjina, Peta, Tadukos, Tetep, H-H, H-5, BPI-76, IR 20 Sigadis, etc.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0240, SURVEY AND ASSESSMENT OF THE SMUT AND BLAST DISEASES OF SUGARCANE

V.A. AWODERU, (NI.131.0042)

A survey of the occurence of the diseases throughout the federation. Assessment of the damage done by each of the diseases to the case affected.

The smut disease appears to be endemic, commonly found in the Kwara State (Bacita - Jelba). Sugarcane varieties resistant to this disease are being selected. Complete loss of cane plots in the case of susceptible varieties have been encountered.

Survey of the blast disease is still in progress.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0241, IDENTIFICATION OF RACES OF PUCCINIA POLYSORA AND HELMINTHOSPORIUM MAYDIS THAT MAY BE VIRULENT TO NCBRB

V.A. AWODERU, (NI.131.0043)

Lallamahomed and Craig (1968) had already identified 2 races of P. polysora. Craig (1971) found a race T. for H. maydis. Maize Composite B NCBRb has been found to be resistant to the existing races of P. polysora and H. maydis. Any susceptible reaction exhibited by this maize composite NCBRb will be as indication of a new race of the fungus concerned. It is important to know if races of H. maydis and P. polysora, capable of causing severe damage to NCBRb, exist before these races cause severe losses in wide spread epiphytotics.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0242, ASSESSMENT OF THE LOSS IN YIELD ATTRIBUTABLE TO MAIZE RUST AND MAIZE BLIGHT

V.A. AWODERU, (NI.131.0044)

This involves planting out of 10 different maize varieties that have economic importance in breeding. Two of these are standard varieties 033 (susceptible) and NSI (resistant) with which the other 8 will be compared. This is being carried out in randomized complete block design.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0243, VIRUS DISEASES OF SOYA BEAN

B.A. OKUSANYA, (NI.131.0045)

Investigations of the virus diseases of soya bean with the aim of screening for resistant varieties.

Observations of soya bean plants in the field on trial sites in the Federation and the isolation and transmission studies in the glasshouse.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0244, SELECTION OF BEAN VARIETIES RESISTANT TO BEAN VIRUSES IN THE FIELD

B.A. OKUSANYA, (NI.131.0046)

Screening of bean varieties for sources of resistance to bean viruses.

Field observations in the breeder's trial sites and mechanical inoculation in the greenhouse.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0245, REDUCTION OF SUGARCANE MOSAIC VIRUS

B.A. OKUSANYA, (NI.131.0047)

To screen the varietal collection at Moor Plantation for sugarcane mosaic in order to decrease spread of the disease.

Artificial inoculation of diseased material to an indicator host plant to verify infection in the greenhouse.

This has led to reduction in the rate of spread of the disease in the past.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0246, STUDIES ON BEAN (COWPEA) VIRUS DISEASES AND THE COLLECTION AND RE-ESTABLISHMENT OF INFECTIVE CULTURES

B.A. OKUSANYA, (NI.131.0048)

To isolate viruses attacking bean plants in order to obtain working cultures for varietal resistance trials.

Field observations on bean fields, isolation and bulking of the viruses from infected plants in the greenhouse.

Work on bean viruses has been carried out in this Department, but since my assumption of duty as the virologist, no adequate records were found. Hence these investigations may have to be re-assessed and started at a reasonable point.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0247, INVESTIGATION INTO THE CAUSES OF YAM-TUBER ROTS

S.K. OGUNDANA, (NI.131.0049)

Objective and Approach: The objective was to visit local farms and government demonstration and experimental plots at harvesting and during storage to evaluate types of tuber rots, characterise the different organisms responsible for the rots to see whether different organisms are responsible for rots at harvesting and during storage. Also to find out the effect of the soil mineral status on the preharvest rot. The results might suggest a means of control.

Progress: No correlations found between the soil mineral status and rot at harvesting. Organisms responsible for rot at harvesting and storage rot were the same in many cases and different in some cases.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0248, DETERMINATION OF THE MODE OF FUNGICIDAL YAM TUBER PROTECTION

S.K. OGUNDANA, (NI.131.0050)

Objective: This exercise was designed to find the means of control of yam tuber rots caused by some fungi.

Approach: The effects of some selected fungicides on the germination of the spores of the pathogens as well as their effects on the growth of the pathogens were investigated in order to select the effective fungicides for yam control in storage.

Progress: Captan was effective at 20 ppm in preventing the spore germination while Benlate and Thiabendazole at 40-60 ppm were effective in preventing the growth of the pathogens. The three fungicides were therefore selected for the control of yam storage rots.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0249, CONROL OF YAM STORAGE ROTS

S.K. OGUNDANA, (NI.131.0051)

Objective: Three types of yam rot have been observed both at harvesting and in storage and the exercise of this study is to see how the rots occurring at the two different stages could be controlled chemically.

Approach: Yam sets for planting were pretreated with systemic fungicides, and planted; yam tubers for storage were also treated with some fungicides, as well as other promising fungicides, before storage.

Progress: Benlate and Thiabendazole (TBZ) were effective in reducing rot at harvesting; while Captan, TBZ and Benlate were also effective in reducing storage rot.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0250, MEDIUM TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY RESTORATIVE POWERS OF MEDIUM DURATION FALLOWING

B. BOSE, (NI.131.0052)

Objective: A comparison of soil fertility restorative powers of two and three years' lengths of fallows comprised of selected strains of pasture grasses and legumes as measured by a subsequent test crop of maize.

Approach: A randomized block design with three replications. The main treatments consist of two and three year lengths of fallows made up of four individual grasses, viz: Pennisetum purpureum, Cynodon plectostachyus, Andropogon gayanus, Panicum maximum; two legumes viz: Centrosema pubescene, and Pueraria phaseoloides and a grass plus legume mixture (Cynodon plus Centrosema). Sub-objective includes assessment of the following parameters viz: (a) Ease of establishment and eradication of species; (b) comparative response to high and low levels of nitrogenous fertilizers applied to the fallow; (c) comparative effect of the fallow species on soil pH, soil moisture retentivity, total soil nitrogen, soil organic matter, percentage base saturation, level of cationic saturation and basic plant nutrients. Test crop of maize (Zea mays NS-I) will be grown for two years.

Progress: The two and three year lengths of individual fallows were ploughed in the early season of 1972. Maize crop was grown in 1972-73 cropping season. Statistically significant yield increase of grains was obtained, in early season crop, from the fallow consisting of a mixture of Cynodon plus Centrosema. This was followed closely by Centrosema fallow. All the fallows species, singly or in a mixture, gave better yield performance than control. Late season crop was affected by acute drought resulting in poor yields.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0251, PHOSPHATE PLACEMENT TRIAL

R.K. PANDEY, (NI.131.0053)

Objective: To study the effect of method, rate and time of phosphorus application on the growth, chemical composition and

yield of maize and cowpeas grown under comparatively high and low rainfall areas of the Western State.

Approach: A randomized split-plot design with four replications. The treatments consist of 3 times of application, 2 rates of application using five methods of application; Time: (1) At planting; (2) 4 weeks after planting; (3) 6 weeks after planting. Rates: (1) 10 lbs P2O5/acre; (2) 20 lbs P2O5/acre.

Methods: (1) Banded on both sides; (2) Localized placement; (3) Broadcast at planting; (4) Broadcast before ridging; (5) Below seed level at planting.

Progress: No statistical differences were obtained between various methods of phosphate application with either crop at any of the sites. P2O5 application 6 weeks after planting was statistically inferior to that at planting time, or 4 weeks after planting. No significant yield difference due to application of P2O5 at 10 or 20 lbs/acre. However, P2O5 application gave increased yield in maize and cowpea crops. The sorption capacity of these soils being very low, there is no economic justification for application of phosphorus at higher rates in these soils. Neither method nor time of application had any significant yield response.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0252, BASIC SLAG AND SINGLE SUPERPHOSPHATE AS PHOSPHATIC FERTILIZERS

B. BOSE, (NI.131.0054)

Objective: To investigate the comparative efficiency of basic slag and single sources of phosphatic fertilizers for the cultivation of arable crops and permanent pastures under Nigerian conditions.

Approach: A simple randomized block design with four replications. Main treatment includes five levels each of basic slag and single superphosphate at the rates of 0, 20, 40, 60 and 80 lbs P2O5 per acre applied annually. N and K are applied as basal dressing at the rates of 40 lbs N and 40 lbs K2O per acre for maize and permanent grass (Cynodon plectostachyus) and 20 lbs N/acre and 40 lbs K20/acre for cowpeas. Each P2O5 treated plot progressively split for 'treated' and 'untreated' treatments in the succeeding years to follow the residual effect of the previous years' applications.

Progress: P2O5 treatments in either form (slag or super) gave better crop performance and yield compared to 'no' treatment. There were no significant differences between the different rates of P205 applied in either form. The soils being highly sandy with low phosphate sorption capacity, there is no economic justification in using higher rates of P2O5 beyond 20 lbs/acre for annual applications. At higher rates both farms appear to have good residual value. However, two year applications of slag seems to compare favourably with three year applications and superphosphate.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0253, APPLICATION OF RADIOTRACER TECHNIQUE IN THE DETERMINATION OF SOIL AVAILABLE PHOSPHORUS

B. BOSE, (NI.131.0055)

Objective: To study the comparative efficiencies of three methods of analysis of available phosphate viz: Standard Bray and Kurtz I, Water Extraction and Radiotracer Technique in the determination of soil available phosphorus, (A-value) of soils using maize and cowpeas as test crops.

Approach: (a) Pot culture greenhouse study using 32P labelled phosphate as a standard in a sample randomized block design with 3 replications. Soils of widely variable fertility used for growing the crops under controlled conditions. (b) Standard laboratory analysis for the uptake and distribution of P by the above three methods.

Progress: Preliminary investigations indicate the superiority of radiotracer technique over the generally accepted Bray and Kurtz I method for the determination of available phosphates. The water extraction method seems to give much lower values which could not be correlated with the uptake of P in maize crops at 30 cm. and 60 cm. growth stages. Radiotracer values appear to give a better correlation.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0254, LONG TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY UNDER THREE FUNDAMENTALLY DIFFERENT FARMING SYSTEMS

B. BOSE, (NI.131.0056)

Objective: To compare the effect on soil productivity of: (a) continuous cropping; (b) four years' cropping alternating with four years' grass fallow and (c) four years' cropping alternating with four years' grass ley. Sub treatments include four levels of nitrogenous fertilizer, two levels each of phosphatic and potassic fertilizers in combination with all other treatments.

Approach: A multifactorial confounded field trial using Pennisetum purpureum (Elephant grass) as fallow (F1) and ley (F2) grass. Test crop is a four year cropping consisting of a 2 year cycle viz: Cassava (Manihot utilissima 53101), cowpeas (Vigna unguiculata "Prima") in the late season and Maize (Zea mays Ns-I) in the early season. Continuous cropping (F0) follows the two year cycle of above test crop uninterruptedly. Fallow grass (F1) is maintained on a cutting regime of 10 weeks ("cut and leave") and ley (F2) cuttings using the same regime are fed to livestock and dung returned to the plots ("cut and remove") in proportion to herbage production.

Fertilizer applications: Annual application of four levels of nitrogenous fertilizer, viz: 0, 30, 60 and 60 (split) lbs N/acre as sulphate of ammonia. Biennial application of two levels each (0, 40 lbs/acre) of P2O5 and K2O respectively as single superphosphate and Muriate of Potash.

Special note: There had been compost application at the rate of 2 tons/ acre on a sub-plot basis up until 1967 after which the practice was discontinued. Residual effect of the compost application is appreciable even five years after the last application was made.

Progress: Although originally commenced in 1962, the present 8 year cycle of the trial is reckoned to have been started in July 1966 owing to errors in fertilizer and compost applications to some plots in the earlier years. No statistical data available as yet. However, the first four years' results very effectively demonstrate the supremacy of fallowing over continuous cropping both in terms of yield performance as well as soil properties. F1 (true fallow) is much better than F2 (ley) where the initial benefits appear to be short-lived. Most striking effect however has been the continuous residual effect of compost application.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0255, RHIZOSPHERE MICROFLORA CONTRIBUTION TO PHOSPHATE DISSOLUTION

B. BOSE, (NI.131.0057)

Objective: (a) To study the interrelationship of rhizosphere microflora with growth and nutrient uptake of a crop; (b) To investigate the contribution, if any, of specific microbial isolates from rhizosphere to the dissolution of insoluble inorganic phosphates and their increased availability in a growing crop.

Approach: Microbiological examination of rhizosphere and non- rhizosphere soils from a test crop grown in pot culture isolation, and cultivation of organisms capable of dissolving insoluble inorganic phosphates. Simultaneous chemical analysis of soil and plant material for phosphorus content. Eventual use of promising organisms for soil/seed inoculation.

Progress: Considerable fluctuation in bacterial population with an initial lag period seems to be tied up with the growth stages of the crop itself. 20 to 25 percent of bacterial isolates indicated effective phosphate dissolving capability as evidenced by clearing on inoculated agar medium containing precipitated inorganic phosphate. Reintroduction into soil will be taken up later in the future.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0256, PESTS OF SWEET POTATOES
M.L. JERATH, (NI.131.0058)

To study the biology and distribution of Cylas sp. and other major leaf feeding pests of sweet potatoes. Field assessment of the pest populations and extent of damage caused are being studied along with life history studies in the laboratory.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0257, SCREENING OF MAIZE GERMPLASM FOR RESISTANCE TO INSECT PESTS
M.L. JERATH, (NI.131.0059)

To screen available maize varieties for resistance to stem borers and maize aphids in the field and greenhouse at Ibadan.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0258, PESTS OF EUPATORIUM ODORATUM
M.L. JERATH, (NI.131.0060)

To rear the imported pests of Eupatorium and assess their establishment and performance in the laboratory and field. The Commonwealth Institute for Biological Control has made available Ammalo insulata collected from Trinidad for field releases in Nigeria. The insect is being reared in the laboratory.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0259, PESTS OF CITRUS
M.L. JERATH, (NI.131.0061)

To study the biology of fruit piercing moths and scale insects attacking different varieties of citrus in Nigeria.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0260, PRODUCTION OF SILK IN NIGERIA
M.L. JERATH, (NI.131.0062)

To assess the suitability of rearing silkworms for silk production and possibilities of its adaptation by the Nigerian farmers.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0261, PESTS OF OKRA, TOMATOES AND PEPPERS
M.L. JERATH, (NI.131.0063)

To study the incidence and abundance of insect pests attacking tomatoes, okra and peppers and their control by chemicals.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0262, INSECTICIDAL CONTROL OF YAM BEETLE
M.L. JERATH, (NI.131.0064)

To compare the effectiveness of several soil insecticides in controlling yam beetle damage in the field. Several soil insecticides have been tried but Aldrin 2.5 percent dust has given the best control. The trials on time and method of application of insecticides have shown that the best results are achieved when applied to the planting hole at the time of planting.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0263, PESTS OF SUGARCANE
M.L. JERATH, (NI.131.0065)

To study the incidence and biology of lepidopterous stem borers of sugarcane. Three stem borers, Sesamia sp., Chilo sp., and Eldana sacchrina are known to occur on sugarcane but rarely cause appreciable damage.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0264, NEMATODES OF SUGARCANE
K.L. UNNY, (NI.131.0066)

To study the economic importance and extent of damage caused by nematodes to sugarcane.

To study the comparative pathogenicity of Heterodera sacchri, Tylenchorhynchus sp., Meloidogyne sp. and Pratypenchus sp. in the greenhouse.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0265, NEMATODES OF VEGETABLES
K.L. UNNY, (NI.131.0067)

To study the incidence and abundance of plant parasite nematodes attacking tomatoes, pepper and okra.

To compare the effectiveness of Nemagon and DD in controlling nematode damage on tomatoes, pepper and okra.

To screen the available okra varieties for resistance to root knot nematodes in the greenhouse.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0266, SCREENING OF GERMPLASM FOR INSECT RESISTANCE
S.O. DINA, (NI.131.0068)

To screen different lines of cowpeas in the field for resistance to insect pests.

Several varieties of cowpeas will be evaluated on the basis of leaf damage (for pests feeding on leaves), flower and pod damage and number of insects found in them (for pod borer and pea moth). In addition, a count of live insects (adults and/or immature stages) will be carried out for some other major pests.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0267, RESEARCH AND DEVELOPMENT IN GENERAL HORTICULTURE, ESPECIALLY FRUITS AND VEGETABLES
O.O. ADIGUN, (NI.131.0069)

OBJECTIVE: To increase the efficiency of the horticultural and related industries in Nigeria, and through this to improve the supplies of fruits and vegetables to the local and export markets and to the processing industry, thus to add to the prosperity and nutritional standards of the people as well as to increase national earnings of foreign currency.

APPROACH: By carrying out experiments in commercially important problems in the production and presentation of fruits

and vegetables. Demonstrate the proper methods of growing, maintenance and handling of fruits and vegetables to technical and other interested people in the country.

PROGRESS: The project is just at its initial stage. We are evaluating the materials available in Nigeria on fruits and vegetables.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0268, THE INCIDENCE AND EXTENT OF DAMAGE DONE TO COWPEAS BY THE LEAFHOPPER EMPOASCA DOLICHII

S.O. DINA, (NI.131.0070)

Leafhopper feeding on cowpeas causes stunting and chlorosis. The objective is to assess the loss in yield due to these symptoms.

The insect complex of cowpeas is differentially controlled by suitable insecticides in such a way that leafhopper population builds up when other major pests are eliminated.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0269, SURVEY OF PARASITES AND PREDATORS OF MARUCA TESTULALIS AND LASPEYRESIA PTYCHORA

S.O. DINA, (NI.131.0071)

To find out if there are any parasites or predators which can be integrated into the control programme of these two major pests of cowpeas.

Larvae (both living and dead) from different localities are collected and observed in the laboratory for emerging parasites (if any). Observation is carried out in the field for incidence of predation. So far only a certain ant species has been found to prey on Maruca larva.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0270, INSECTICIDAL CONTROL OF COWPEA PESTS

S.O. DINA, (NI.131.0072)

To screen several insecticides for their effectiveness in controlling pests of cowpeas and increasing the yield of the crop.

The insecticides are sprayed on the crop during the flowering and pod maturation periods when severe losses due to Maruca testulalis and Laspeyresia ptychora occur.

Of the insecticides tried, 3 weekly applications of Nuvacron and Gammalin at 1 lb/acre active ingredient have given good control and increased yield.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0271, SURVEY OF MAIZE NEMATODES

O.O. OLOWE, (NI.131.0073)

Objective: Survey of nematodes associated with maize.

Approach: Survey on maize nematodes shows that 16 genera of nematodes are associated with maize. Pratylenchus species, P. scribneri, P. brachyurus and P. zeae, were the most consistent nematodes encountered suggesting that they may be of potential significance in maize yield decline.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0272, HOST STATUS OF PRATYLENCHUS SPECIES

O.O. OLOWE, (NI.131.0074)

To assess the susceptibility of various tropical cereals and legumes to three species of Pratylenchus: (P. scribneri, P. brachyurus and P. zeae).

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0273, POPULATION DYNAMICS

O.O. OLOWE, (NI.131.0075)

To examine the population trend of various nematodes under various crops in 2 rotational fields at Moor Plantation, Ibadan.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0274, CHEMICAL CONTROL

O.O. OLOWE, (NI.131.0076)

To determine the effectiveness of two nematicides (Nemagon and D D) in controlling maize nematodes.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0275, MAIZE FERTILIZER TRIAL

F.K. ADEYEFA, (NI.131.0077)

Objective: To determine the optimum rate, time and method of application of nitrogen to maize.

Approach: Use of recommended maize varieties Didcol-V-153, Composite C and NSI. 3 X 3 X 3 compounded factorial in blocks of nine plots each with one control. Levels of N ranges: N1 equals 1 1/2 cwt/acre, N2 equals 3 cwt per acre and N3 equals 4 1/2 cwt per acre of (NH4)2 SO4. Previous results are being analysed.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0276, MAIZE HERBICIDE TRIAL

A. WILLIAMS, (NI.131.0078)

OBJECTIVE: To compare the effectiveness and economics of different methods of weed control in maize.

APPROACH: Randomised block design with four replicates. Herbicides in use are Gesaprim at 2-4 lbs ai/acre, Simazine 2-4 lbs ai/acre, Bladex at 2-4 lbs ai/acre and hoe weedings.

PROGRESS: Results have been obtained for two years now for previous studies carried out at Ibadan but are now being extended to other ecological zones of Nigeria. So far, Simazine, Gesaprim and Bladex have proved very successful in weed control in maize.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0277, IDENTIFICATION OF RICE VARIETIES RESISTANT TO THE BROWN SPOT OF RICE CAUSED BY HELMINTHOSPORIUM ORYZAE

P.E. ONUORAH, (NI.131.0079)

OBJECTIVE: To screen upland rice varieties for resistance to the brown spot organism and thereby locate genes for breeding purposes.

APPROACH: Exposure of about 900 upland rice varieties to natural and artificial infection to determine relative sensitivity to the pathogen. Severe screening for only resistant ones.

PROGRESS: 12 varieties have not become diseased after tests in 3 consecutive years.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0278, STUDIES ON THE HOST RANGE OF HELMINTHOSPORIUM ORYZAE

P.E. ONUORAH, (NI.131.0080)

OBJECTIVE: To determine wild grasses that could serve as alternative hosts to the fungus.

APPROACH: a) Artificial conidial inoculation of potted grasses in the glasshouse, b) Field check on grasses growing in nature for natural infection by the fungus.

PROGRESS: 8 local wild grasses are potentially capable of hosting the fungus. Two of these do so in nature.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0279, DETERMINATION OF SAPROPHYTIC SURVIVAL OF HELMINTHOSPORIUM ORYZAE IN RICE SEEDS AND STRAW

P.E. ONUORAH, (NI.131.0081)

Objective: To determine the length of survival of the fungus in rice seeds and in straw left lying in the field with a view to determining the potential of these sources as perennation media.

Approach: a) Monthly isolation of fungus from seeds in wet dishes. b) Isolation attempts from infected rice straw in the field, some buried, others on the surface.

Progress: 1) The fungus continues to survive in rice seeds after 2 years. 2) It survives from one season to the next in infected rice straw left lying on the field, but not in those buried in the soil.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0280, FIELD CONTROL OF THE BROWN SPOT OF RICE USING FUNGICIDES

P.E. ONUORAH, (NI.131.0082)

Objective: To select fungicides effective in controlling the disease in the field and to determine dosages, frequencies of application and optimum application time for best results.

Approach: Laboratory screening of fungicides for toxicity and field applications.

Progress: Three proprietary fungicides are effective, but one is phytotoxic. The best application time is when plants are 8 - 12 weeks old. Three applications are adequate.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0281, EFFECT OF PLANT NUTRITION ON RESISTANCE AGAINST THE BROWN SPOT OF RICE CAUSED BY H. ORYZAE

P.E. ONUORAH, (NI.131.0083)

Objective: To determine the extent of disease reduction that could be achieved by use of different levels of Nitrogen, Phosphorus and Potassium fertilizers.

Approach: Application in the field of N, P and K in a factorial manner.

Progress: Indications are that N and K help reduce disease, but P does not.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0282, SURVEY OF THE DISEASES OF THE IMPORTANT VEGETABLES IN NIGERIA

P.E. ONUORAH, (NI.131.0084)

Objective: To draw up a check-list of the diseases of some important vegetables in the country.

Approach: Description of symptoms, isolation of microorganisms, determination of etiology and identification of the pathogen.

Progress: Several fungal and bacterial pathogens have been associated with various vegetables.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0283, TO SCREEN SULPHUR-FREE FUNGICIDES FOR EFFECTIVENESS IN CONTROLLING MILDEWS IN CUCURBITS

P.E. ONUORAH, (NI.131.0085)

Objective: To locate fungicides effective against mildews without being phytotoxic to cucurbits in the tropics.

Approach: Field application of fungicides.

Progress: To be determined.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0284, STUDIES ON THE CHOANEPHORA CUCURBITARUM WET ROT OF AMARANTHUS VIRIDIS

P.E. ONUORAH, (NI.131.0086)

Objective: To determine factors that encourage infection in the field, extent of damage and possible control measures.

Approach: Relationship between plant age, meteorological factors and infection in the field. Blanket control with fungicides to determine extent of damage by fungus. Breeding for resistance.

Progress: To be determined.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0285, STUDIES ON THE HOST-PARASITE RELATIONS OF RICE AND HELMINTHOSPORIUM ORYZAE

P.E. ONUORAH, (NI.131.0087)

Objective: To determine the mode of penetration of host by parasite, parasite spread within the tissues and factors that influence it.

Approach: Tissue cultures: tissues inoculated, stained and sectioned.

Progress: To be determined.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

NIGERIAN INSTITUTE FOR OIL PALM RESEARCH

P.M.B. 1030, Benin City

9.0286, THE INSECT PESTS OF THE OIL PALM IN NIGERIA

S.I. AGWU, (NI.270.0001)

OBJECTIVE: Identification and assessment of pest status of insect pests of the oil palm in the country.

APPROACH: (a) Surveys, collection and identification of the palm in nursery and in field in NIFOR, and in the oil palm areas of the country. (b) Estimates of the levels of damage by, and the population patterns of, the various insect pests.

PROGRESS: The project has just started, but some lepidopterans, hemipterans and coleopterans have been collected for identification.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0287, IDOLATRICA CHARACTER (OIL PALM)

C.O. OBASOLA, (NI.270.0002)

OBJECTIVE: To study the mode of inheritance of the idolatrica leaf.

APPROACH: The mode of inheritance of the idolatrica leaf is not known. Evidence is conflicting and it has been thought by

different workers to be both dominant and recessive. Crosses carried out so far have confused the matter further, as no definite trend can be found in seedlings obtained from these crosses. Three types of idolatrica palms have been identified and a programme of crosses is in progress. A field planting will be carried out to see whether the mode of the inheritance of the idolatrica leaf can be worked out.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0288, DORMANCY IN SEEDS FROM DELI PALMS (OIL PALM)

C.O. OBASOLA, (NI.270.0003)

OBJECTIVE: To investigate the genetic basis for low dormancy requirement of seed from Deli palms.

APPROACH: In 1966, an investigation into seed heat requirement was started because differences in the heat requirement to break dormancy in seed of different origins was detected. In fact, two Deli palms were found to germinate during storage at 22.2 degrees C when kept moist. This indicated that population of Deli has a dormancy requirement different from the open pollinated Nigerian dura and tenera seed. Seeds from controlled pollination using as female parents the two Deli palms showing little or no dormancy have continued to give good germination with no or minimal heating in a germinator. Crosses have now been made between these palms and the progeny in the selfing of one of them and the resulting palms have been planted out in the field to test for dormancy in the back crosses.

Progress: The experiment is in the field, no report.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0289, POLLEN STORAGE (OIL PALM)

C.O. OBASOLA, (NI.270.0004)

OBJECTIVE: To study all aspects of preparation and prolonged storage of pollen.

APPROACH: Pollen grains are vacuum dried (using a high vacuum pump) in ampoules for 20 minutes and sealed, then stored in a deep freeze at -18 degrees C.

PROGRESS: This investigation was started in 1967. Pollen vacuum dried in ampoules for 20 minutes, sealed and stored in a deep freeze at - 18 degrees C in 1967, still showed 80-90% viability when tested 3-4 years later. No abnormal seedlings were produced in the pre-nursery or nursery when this pollen was used in controlled pollination. This investigation continues.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0290, PISIFERA PALM SELECTION

C.O. OBASOLA, (NI.270.0005)

OBJECTIVE: To widen the range of selection criteria in the variety pisifera of the oil palm.

APPROACH: At the moment pisifera are chosen from progenies of T selfings or T x T crosses involving parents which have performed well in D x T progeny trials. As sterile pisifera are used for seed production, they can only be identified by the use of growth active substance after they have produced parthenocarpic fruits in the field thrice. In order to widen the selection criteria, the following points are being considered: (1) Sex-ratio; (2) Potential bunch size; (3) Extent of fibre- ring; (4) Systematic comparison of sib tenera and pisifera in a range of tenera x tenera progenies.

PROGRESS: The pisifera has been categorized and sex-ratio, potential bunch size, extent of fibre-ring are being examined critically.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0291, SHORT-STEMMED OIL PALM

C.O. OBASOLA, (NI.270.0006)

OBJECTIVE: To study the inheritance of the short stem character in oil palm and ultimately to produce Extension Work Seeds true breeding for short stem.

APPROACH: Five approaches are now being employed in breeding short stemmed oil palm at NIFOR. (1) Introduction of Deli dumpies from Malaya. (2) Introduction of dumpy palms from Pobe, Dahomey. (3) Selection of short, local materials in NIFOR and elsewhere in Nigeria. (4) Crosses between Corozo oleifera and Elaeis guineensis. (5) Crosses involving Elaeis guineensis, Corozo oleifera x Elaeis guineensis hybrids Pobe and Malayan dumpies.

PROGRESS: Corozo oleifera has been successfully crossed with Elaeis guineensis and short stemmed vigorous F1 hybrids have been obtained. The average yield obtained from the hybrids were comparable with that from Elaeis guineensis and superior to Corozo oleifera. Bunch quality of F1 hybrids was however inferior to that of selected Elaeis guineensis.

Furthermore, all the dumpy palms mentioned above have been crossed in all possible combinations and the field trials will soon be carried out.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0292, POTASSIUM IN THE SOILS OF THE NIGERIAN OIL PALM BELT

D.O. ATAGA, (NI.270.0007)

OBJECTIVES: Study of dynamics and mineralogical aspects of the uptake, release and fixation of potassium in the soil.

APPROACH: Study has been carried out on the status of K in soils in relation to leaf K and bunch yield of palms. More studies are being carried out on the release and fixation of K by soils and different size fractions of soils. Particular attention will be paid to the significance of amorphous aluminosilicates in the release and fixation of K in these soils.

PROGRESS: Work done already showed that basement complex soils have appreciable K reserves while the acid sand soils have only little exchangeable K. Also the acid sand soils were found to be able to fix K to a reasonable extent. More studies are now in progress to elucidate the role of the various soil components in the K release and fixing characteristics of these essentially kaolinitic soils.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0293, SOIL PHOSPHORUS AND RESPONSES OF THE OIL PALM TO PHOSPHORUS FERTILIZATION

D.O. ATAGA, (NI.270.0008)

OBJECTIVE: (1) Determination of the form and distribution of phosphorus in representative soil profiles supporting the oil palm. (2) Evaluation of the use of the phosphate potential method and some conventional extraction methods for assessing phosphorus needs of palms in the greenhouse and in the field.

APPROACH: In the case of (2), plant responses as measured by absolute yield, relative yield and P uptake of oil palm seedlings in a greenhouse experiment and in the field are related to the various chemical measurements of phosphorus.

PROGRESS: Results of work done so far show that total P in soils generally is in the range 300 ppm - 800 ppm. The phosphate occurs mainly in the iron phosphate form. Work in the greenhouse using absolute yield, relative dry matter yield and P uptake as response criteria show that phosphate potential and Bray and

Kurtz's methods gave the best results for predicting phosphate needs of palms.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0294, SOIL MOISTURE AND THE GROWTH OF THE OIL PALM IN THE ACID SAND SOILS OF SOUTHERN NIGERIA

D.O. ATAGA, (NI.270.0009)

OBJECTIVES: (1) Determination of soil moisture constant and water storage capacity of Typical Soil Profiles in the Oil Palm Belt. (2) Study of moisture reserves and consumptive use and relationship of agrometeorological factors to growth and yield in field irrigation experiments. (3) Effect of drought on development, yield and fertilizer use in irrigation experiments.

APPROACH: Measurement of soil moisture in undisturbed soil profile to be carried out with neutron probe. Pressure plate and pressure membrane extractors will also be used.

PROGRESS: The neutron probe used in this project has been calibrated for use in the field and has been found that while neutron counts/minute were closely related to volume moisture content, separate calibration curve may be necessary for the more clayey and the more sandy soils. Work on moisture reserves and consumptive use is still in progress.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0295, SOIL ACIDITY AND THE GROWTH OF THE OIL PALM

D.O. ATAGA, (NI.270.0010)

OBJECTIVES: (1) Determination of liming requirement of some acid soils supporting the oil palm. (2) Study of chemical effects of liming acid sand soils. (3) Effect of liming and added fertilizers on the growth of the oil palm.

APPROACH: Lime requirement of selected soils determined by conventional method and soils limed to desired pH. After equilibration, chemical analysis is carried out. Effect of liming and different levels of fertilizer treatment (in the first instance, phosphate) on the growth of oil palm seedlings studied in the greenhouse using a complete factorial design.

PROGRESS: Liming had adverse effects on the growth of oil palm. Highest level of additional P fertilizer did not alleviate to any marked extent these bad effects. Effect of foliar applied trace elements mixture will be studied in the next series of experiments.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0296, TRACE ELEMENTS IN THE NUTRITION OF THE OIL PALM

H.C. OKOYE, (NI.270.0011)

OBJECTIVE: (1) Form and distribution of trace elements in typical soils supporting the oil palm. (2) Induction and description of visual symptoms of trace element deficiencies. (3) Effects of some trace elements on the growth and development of oil palm seedlings.

APPROACH: With regard to objective (1) soil samples from typical soil profiles supporting the oil palm will be analysed for trace elements. In the case of (2) studies carried out in sand culture, supplying all elements except the one under investigation. In the case of (3) studies also carried out in sand culture in which graded levels of trace elements are supplied in a 34 factorial combination.

PROGRESS: Results of boron deficiencies were variable and this is associated with the genetic factor. In greenhouse experiments only Cu had linear effect on dry matter yield of seedlings.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0297, CATION-ANION RELATIONSHIP IN THE OIL PALM

H.C. OKOYE, (NI.270.0012)

OBJECTIVE: To examine nutrient balances - cations (C) on the one hand and anions (A) on the other - to see if the difference between them is as constant as has been observed for some crops; and the relationship between the value C-A and bunch yield and-/or growth of the palm.

APPROACH: Both the essential mineral elements commonly found in plant tissues and also the organic acid anions that account for the difference between C and A will be determined. The effect of age, fertilizer treatment, gene types, seasons of the year and soil types on the C-A value will also be examined.

PROGRESS: Programme just about being initiated.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0298, A CALIBRATION TRIAL ON OIL PALMS EXPERIMENT 8-1 (PLANTED 1959-1966)

S.E. NNABUCHI, (NI.270.0013)

OBJECTIVE: 1. To enable an assessment to be made of the growth pattern of the oil palm under certain conditions independent of climatic variations. 2. To investigate th effect of climate on yield and other characters of the oil palm.

APPROACH: (1) Leaf and flower observation to determine sex ratio and rate of leaf production. (2) Measurements of height and girth taken once per year or preferably twice (at the beginning and at the end of the wet season). (3) Complete yield records of number and weight of bunches. (4) Fruit and bunch analyses on samples from the plots. (5) Leaf sampling. (6) Soil sampling.

PROGRESS: Mean bunch production per acre (based on number of palms for the first three harvests analysed. The variation within each harvest was pronounced showing the effect of environmental factors independent of age of palms. Results of analyses of height measurement showed differences between progenies and between planting. The work is continuing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0299, SEEDLING SELECTION EXPERIMENT 33-13 (PLANTED 1966)

S.E. NNABUCHI, (NI.270.0014)

OBJECTIVE: To investigate the effect of seedling growth on subsequent yield of the oil palm.

APPROACH: (I) Prenursery (1) Identity of each leaf (2) Number of leaflets on fronds 4, 10 (3) Height of longest fully opened leaf and record of each leaf monthly (4) Death or disease recorded on each seedling. (II) Nursery. As per prenursery. (III) Field (1) Identity of each leaf giving rise to information on which leaf the first inflors are found in (2) Leaf and flowering observations (3) Height measurement (4) Canopy measurement (5) Yields.

PROGRESS: (1) It has been observed that number of leaves produced by a tree before entry into production varies from palm to palm even within progeny and the time observed for such entry also varies. (2) Virtually all leaves that produced first inflorescence were produced in the field and not in the nursery. (3) The first inflorescence is mostly male. The work is continuing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

NIGERIA

9.0300, EFFECT OF THE SIZE OF SEEDS ON SUBSEQUENT GROWTH AND YIELD - EXPERIMENT 9-8 (PLANTED 1970)

S.E. NNABUCHI, (NI.270.0015)

OBJECTIVE: To investigate the effect of different sizes of oil palm seed on subsequent growth and yield.

APPROACH: 1. Prenursery: Weight of each seed. 2. Germinator: (1) Germination count (2) Sprouting count. 3. Prenursery: (1) Emergence count (2) Identity of each leaf (3) Height of highest opened leaf and record of each leaf monthly (4) Death or disease recorded on each seedling. 4. Nursery: As per prenursery. 5. Field: (1) Identity of each leaf (2) Which leaf subtends first inflorescence, number of its leaflets and height of palm when first inflorescence is observed (3) Height measurement (4) Canopy measurement (5) Girth (6) Height from ground to crown (7) Yield (8) Fruit and bunch analysis (9) Leaf Sampling (10) Leaf and flowering observations.

PROGRESS: Results of germination, sprouting and emergence of each seed size determined. Assessment of effects of nursery is in progress. The work is continuing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0301, EMPERIMENT 17-1 WEED CONTROL IN OIL PALM PLANTATIONS

F.O. AYA, (NI.270.0016)

OBJECTIVE: (1) To study the influence of the combination of different mechanical implements used for maintaining the interlines of oil palm plantations during the course of the rainy season on the bunch yields of palms. (2) To evaluate the use of herbicides for maintaining weed-free circles around the palms.

APPROACH: The experimental design was randomized into blocks with split-plots replicated 4 times. Main plots of 56 palms and sub-plots of 15 palms. The progeny used were special grade Extension Work Seeds (E.W.S.), spaced at 30 ft triangular. The implemented combinations were: (a) Marden roller year round. (b) Marden roller in early and mid- rains (April & June respectively) with Rome discs (cultivator) at the end of the rains (November). (c) Ring roller year round. (d) Ring roller in early and mid-rains with Rome discs at the end of the rains. (e) Slasher year round. (f) Slasher in early and mid- rains with Rome discs at the end of the rains. The herbicides were (1) atrazine plus paraquat, (2) monuron plus paraquat, (3) diuron plus paraquat, all compared with hand weeding.

PROGRESS: The combination of the cultivator with the ring roller at the end of the rains has increased yields by 11.8% and sub-plots ring weeded with diuron plus paraquat have yields 2.2% higher than the hand weeded control.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0302, EXPERIMENT 17-2. MECHANICAL MAINTENANCE AND MULCHING TREATMENTS OF OIL PALM PLANTATIONS

F.O. AYA, (NI.270.0017)

OBJECTIVE: (1) To study the effect of different mechanical implements used throughout the year for maintaining the interlines of oil palm plantations on the ground cover and the bunch yields of the palms. (2) To evaluate the influence of various mulches on the bunch yields of oil palms.

APPROACH: The experimental design were randomized blocks with split-plots replicated 5 times. Main plots of 26 palms and sub-plots of 9 palms. The progeny used were special grade Extension Work Seeds (E.W.S.), planted at 30 ft. triangular. The implements investigated were: (a) Hand maintenance (b) Ring roller (c) Slasher (d) Brushcutter (set low) (e) Brushcutter (set high) (f) Holt weedbreaker (g) Marden roller (h) Rome discs. The mulching treatments were: (1) None (2) Polythene mulch (3) Bush mulch.

PROGRESS: The bunch yields in the mechanically maintained plots are 7.8% higher than the hand maintained control. There has been no significant beneficial effects of the mulching treatments on bunch yields.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0303, EXPERIMENT 9-2 - TRACE ELEMENT EXPERIMENT

F.O. AYA, (NI.270.0018)

OBJECTIVE: To evaluate the effects of trace elements applied at the nursery and field stages on the growth and bunch yields of the palms.

APPROACH: The design was a 2X2X2X2X2X2 confounded factorial replicated 8 times. Nursery plots were planted with 30 seedlings at a spacing of 2 1/2 ft. square and field plots were planted with 9 representative palms from the nursery plots at a spacing of 29 feet triangular. The elements which were applied as foliar sprays were (1) Boron (2) Zinc (3) Molybdenum (4) Iron (5) Manganese (6) Copper.

PROGRESS: There have been no significant treatment effects so far although copper and iron tended to depress growth and yields.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0304, EXPERIMENT 9-3 - FREQUENCY AND FORM OF POTASH FERTILIZER EXPERIMENT

F.O. AYA, (NI.270.0019)

OBJECTIVE: To investigate the effects of different frequencies and form of potash fertilizer applied to palms in the field on their fruit production.

APPROACH: The experimental area was cleared and burnt from an old palm plot. The new planting material was special grade Extension Work Seeds (E.W.S.). The design was a 2 x 4 factorial replicated 6 times. Each plot was planted with 12 palms spaced at 29 ft. triangular. The frequency treatments were annual, biennial, triennial and quadrennial while the form of the potash fertilizer was either sulphate or muriate.

PROGRESS: The frequency treatments were not imposed until 1971 and yield data are not yet available. No significant effects of sulphate and chloride forms of the potash fertilizer on the growth of the palms have been observed so far.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0305, EXPERIMENT 9-4 - POLYBAG NURSERY EXPERIMENT (FIELD STAGE)

F.O. AYA, (NI.270.0020)

OBJECTIVE: To compare the field performance of oil palm seedlings raised in various polythene bags during pre-nursery and nursery stages of development with that of seedlings raised by standard NIFOR technique.

APPROACH: The design was a randomised block replicated 4 times. The field plots were planted with representative seedlings from 12 pre- nursery and nursery treatment combinations. The planting material was special grade Extension Work Seeds (E.W.S.) spaced at 29 feet triangular. All seedlings were planted with balls of earth around their roots. In the case of polybag seedlings, the polythene sheets were stripped off before planting.

PROGRESS: During the first year all seedlings transplanted from polythene bags showed significantly greater height increases and produced more leaves than the control.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0306, EXPERIMENT 180-1 - FACTORIAL FERTILIZER EXPERIMENT

F.O. AYA, (NI.270.0021)

OBJECTIVE: To determine the fertilizer requirements of oil palms growing in the Agbarho area of the Midwestern State of Nigeria.

APPROACH: The experimental area was cleared and burnt from a high secondary forest. The planting material was special grade Extension Work Seeds (E.W.S.) spaced at 29 feet triangular and the design was 1/4 replicate of a 4x4x4x4x4 confounded factorial. The experiments investigated the following fertilizer elements at 4 levels and at 4 frequencies of application: (a) N as sulphate of ammonia (b) P as rock phosphate (c) K as sulphate of potash and (d) Mg as sulphate of magnesia. The frequencies of application are: (1) twice yearly (2) once yearly (3) once in two years (4) once in three years. The rates of application are 0, 4, 8 and 12 lbs. per palm over the period of 3 years.

PROGRESS: This is the first year of fertilizer application and no data are available.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0307, EXPERIMENT 508-2

F.O. AYA, (NI.270.0022)

OBJECTIVE: To determine the fertilizer requirements of oil palms growing in Abak area of the South Eastern State of Nigeria.

APPROACH: The experimental area was cleared and burnt from an old palm grove. The planting material was special grade Extension Work Seeds (E.W.S.) spaced at 29 feet triangular and the design was 1/4 replicate of a 4x4x4x4x4 confounded factorial. The experiment investigates the following fertilizer elements at 4 levels and at 4 frequencies of application: (a) N as sulphate of ammonia (b) P as rock phosphate (c) K as sulphate of potash and (d) Mg as sulphate of magnesia. The frequencies of application are: (1) twice yearly (2) once yearly (3) once in two years (4) once in three years. The rates of application are 0, 4, 8 and 12 lbs. per palm over the period of 3 years.

PROGRESS: This is the first year of fertilizer application and no data are available.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0308, EXPERIMENT 768-1 - FIELD IRRIGATION OF OIL PALMS

F.O. AYA, (NI.270.0023)

OBJECTIVE: To determine the amount of irrigation water and the type of mulching required by oil palms growing in the Bida area of the North-Western State of Nigeria.

APPROACH: The experimental area was cleared and burnt from bush fallow. The planting material was special grade Extension Work Seeds (E.W.S.) raised in the nursery by the polybag technique and spaced in the field at 29 ft. triangular. The design was in randomized blocks with split-plots. Main plots of 24 palms and split-plots of 6 palms. The irrigation treatments were: (a) No irrigation (b) 80 litres (c) 160 litres (d) 240 litres (e) 320 litres (f) 400 litres and (g) 480 litres per palm each week, applied only during the dry season (from 15th October to 15th May). The mulching treatments were: (1) None (2) Bush mulch in the dry season only (3) Bush mulch throughout the year (4) Balck polythene mulch throughout the year.

PROGRESS: The irrigation treatments have not been applied and no data are available.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0309, THE INSECT PESTS OF THE COCONUT PALM IN NIGERIA

S.I. AGWU, (NI.270.0024)

OBJECTIVE: Identification and assessment of pest status of coconut insect pests.

APPROACH: (a) Surveys, collection and identification of the insect pests of the coconut in nursery and in field in NIFOR, and in the Country. (b) Estimates of the levels of damage by, and the population patterns of the various insect pests.

PROGRESS: The project has just started; but some lepidopterans, coleopterans and hemipterans have been collected for identification.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0310, THE INSECT PESTS OF THE RAPHIA PALM IN NIGERIA

S.I. AGWU, (NI.270.0025)

OBJECTIVE: To identify and assess the pest status of the insect pests of raphia in Nigeria.

APPROACH: (a) Surveys, collection and identification of the insect pests of raphia in the nursery and in the field in NIFOR, and in raphia areas of the country. (b) Estimates of the levels of damage by, and the population patterns of the various insect pests.

PROGRESS: The project has just started, but some lepidopterans and hemipterans have been collected for identification.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0311, EFFICIENCY OF FERTILIZER UPTAKE BY THE OIL PALM

D.O. ATAGA, (NI.270.0026)

OBJECTIVE: To study the efficiency of phosphorus and potassium fertilizer uptake by the oil palm as affected by soil type, fertilizer placement, season and age of palms.

APPROACH: A radioactive tracer technique using P32 and Rb86 (tracer for K) will be employed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0312, LEAF ANALYSIS IN THE DIAGNOSIS OF THE NUTRITIONAL REQUIREMENTS OF THE OIL PALM

H.C. OKOYE, (NI.270.0027)

OBJECTIVE: To work out reference standards or critical levels by which the nutrient requirements of palms can be diagnosed.

APPROACH: Carrying out regular leaf sampling of palms in fertilizer experiments and correlating leaf nutrient status with palm yield and growth.

PROGRESS: Reference standards and sampling techniques have been worked out for major elements and are continually being re-evaluated.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

NIGERIA

9.0313, IMPROVEMENT OF YIELD, FRUIT AND BUNCH QUALITY OF THE OIL PALM

C.O. OBASOLA, (NI.270.0028)

OBJECTIVE: To distribute improved oil palm seeds (combining high yield with good fruit and bunch quality) to growers.

APPROACH: Two approaches are being employed. (a) Selection of high yielding materials based upon the technique of reciprocal recurrent selection. The design is based on the first generation of progeny trials intended to assess the combining ability of dura and tenera parents which are also selfed to produce parent for extension work. Further generations of the programme follow a similar procedure. (b) Accurate analysis of fruit and bunch characters have to be carried out in an analysis laboratory as variability studies have shown that fruit and bunch characteristics fluctuate with time. Analysis work is organized on an annual basis.

PROGRESS: The project started in 1959 and it is at the moment being assessed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0314, RESISTANCE TO DISEASE IN THE OIL PALM

C.O. OBASOLA, (NI.270.0029)

OBJECTIVE: To develop oil palm lines that are resistant to diseases.

APPROACH: There are three main diseases in the oil palm, each of them soil borne and therefore difficult to control by methods other than plant breeding. These diseases are vascular wilt caused by Fusarium oxysporium, dry basal rot caused by Ceratocystis paradoxa and blast caused by a co-infection of a Rhizoctonia and Pythium species. This is a joint project with Plant Pathology Division. The Plant Pathology Division prepares the inoculum and works out the inoculation technique, while the Plant Breeding Division provides the progenies to be tested.

PROGRESS: A number of progenies have been screened for their resistance/susceptibility to both dry basal rot and vascular wilt. The results are still inconclusive.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0315, GENE POOL - OIL PALM

C.O. OBASOLA, (NI.270.0030)

OBJECTIVE: To maintain a collection of oil palm obtained from Nigeria and other countries for breeding and selection.

APPROACH: Since it is generally agreed among oil palm breeders that the breeding materials being exploited at present come from a very narrow genetic base, prospection in densely populated areas in Nigeria, especially with a view to selection of high oil to pulp, big kernel to fruit and highly adapted palms has been undertaken. Introductions have also been made from other oil palm growing areas of the world. Further prospection is envisaged.

PROGRESS: Materials collected during prospection in the Eastern States and Kwara State of Nigeria have been planted on the main station. The yields are now being recorded. Biometrical, leaf growth and flowering observations are being carried out on them. Materials obtained from other countries and growing on the main station are also being assessed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0316, GENE POOL (COCONUT, RAPHIA, DATE PALMS)

C.O. OBASOLA, (NI.270.0031)

OBJECTIVE: To maintain a collection of coconut, raphia and date palms obtained from Nigeria and other countries for breeding and selection.

APPROACH: Prospection in densely populated areas in Nigeria to enlarge the collection in NIFOR and to assess the types available for the purpose of classification. Introductions from other countries.

PROGRESS: Considerable prospection has been carried out on coconut and raphia in Nigeria. Some introduction has been made from other countries with respect to coconut. Breeding and selection have not yet started.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0317, MILL EFFLUENT STUDIES

P.I. EAPEN, (NI.270.0032)

OBJECTIVE: Sanitary disposal of mill effluent.

APPROACH: Supression of development of foul odour by chemical treatment.

PROGRESS: Work was started only recently and is progressing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0318, CHEMO - TAXONOMIC STUDIES

P.I. EAPEN, (NI.270.0033)

OBJECTIVE: Identification of the type of oil palm at seedling stage.

APPROACH: Chromatographic studies of leaf extract.

PROGRESS: Work was started only recently and is progressing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0319, SUGAR CONTENT OF PALM SAP

P.I. EAPEN, (NI.270.0034)

OBJECTIVE: Study of the variation of sugar content in palm sap.

APPROACH: Work is being carried out over a period of several months covering the various seasons. The total sugars present in fresh palm wine is determined spectrophotometrically.

PROGRESS: Work still going on.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0320, FERMENTATION OF PALM WINE

P.I. EAPEN, (NI.270.0035)

OBJECTIVE: To determine the factors affecting fermentation of palm wine.

APPROACH: The effect of temperature, period of storage, of chemicals added are being looked into.

PROGRESS: Work is progressing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0321, LIQUID AND SOLID COMPONENTS OF PALM OIL

P.I. EAPEN, (NI.270.0036)

OBJECTIVE: Study of the characteristics of the liquid and solid components of palm oil.

APPROACH: Determination of the relative amounts of liquid and solid components in the oil, the temperature suitable for their separation.

PROGRESS: Work still going on.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0322, STUDIES ON THE OIL PALM PATCH YELLOWS

K. RAJAGOPALAN, (NI.270.0037)

OBJECTIVE: To determine the role of Fusarium oxysporum found in association with the disorder and to devise methods of controlling the disorder.

APPROACH: (1) Spraying spore suspension on mechanically-injured and non-injured leaves. (2) Injection of a spore suspension into the base of the spear leaf. (3) Screening progenies for resistance to the disorder.

PROGRESS: Results so far obtained indicate that certain progenies are highly susceptible while some others are highly resistant to the disorder. The experiment is being continued.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0323, THE CONTROL OF THE OIL PALM DRY BASAL ROT DISEASE

K. RAJAGOPALAN, (NI.270.0038)

OBJECTIVE: To control the oil palm dry basal rot disease (caused by Ceratocystis paradoxa) by the selection of resistant varieties.

APPROACH: Roots of the seedlings were dipped in the inoculum and planted in the nursery. The roots and leaves of the seedlings were screened visually for disease development 4 weeks after inoculation.

PROGRESS: The experiment is being continued.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0324, CONTROL OF THE OIL PALM VASCULAR WILT DISEASE

K. RAJAGOPALAN, (NI.270.0039)

OBJECTIVE: To control the vascular wilt disease (incited by Fusarium oxysporum) by the selection fo resistant varieties of the oil palm.

APPROACH: (1) Dipping the roots in inoculum and planting in concrete trays. (2) Mixing the pathogen with oil before planting seedlings and then determining the reduction in 'leaf area product' or 'dry matter content'.

PROGRESS: The experiments are still being assessed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0325, FUNGICIDAL SPRAYING AND LEAF PRUNING TRIAL FOR THE CONTROL OF CERCOSPORA LEAF SPOT

K. RAJAGOPALAN, (NI.270.0040)

OBJECTIVE: To determine the long-term effect of spraying to control Cercospora leaf spot in the field on the yield of the oil palm.

APPROACH: Fungicidal spraying and leaf pruning were terminated after 18 months of field planting. Yield recording for 3 years.

PROGRESS: Results are being assessed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0326, CONTROL OF CERCOSPORA LEAF SPOT OF THE OIL PALM

K. RAJAGOPALAN, (NI.270.0041)

OBJECTIVE: To control Cercospora leaf spot (caused by Cercospora elaeidis) by using fungicides and by the selection of resistant varieties of the oil palm.

APPROACH: (1) Screening of various fungicides (using tenac as a sticker) against the disease in the nursery and field. (2) Screening of different progenies of the oil palm for resistance to the disease.

PROGRESS: Effective control of the disease is achieved by spraying seedlings fortnightly with Dithane M45. Production of conidia by C. elaeidis (required for screening different progenies of the oil palm) has been successfully induced in vitro.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0327, THE OIL PALM BLAST DISEASE AND ITS CONTROL

F.O. ADERUNGBOYE, (NI.270.0042)

Objective: To control the oil palm blast disease caused by Pythium sp. and Rhizoctonia lamellifera.

Approach: (1) Control of the blast disease by agronomic practices (watering, shading, date of planting, polythene bag planting etc.) (2) Chemical control of the blast disease (Dexon, Terraclor Super X, PCNB, Benlate, Vapam, etc.) (3) Control of the oil palm blast disease by the selection of resistant varieties.

Progress: Seedling mortality was found to be considerably reduced by shading nursery seedlings in the dry season (October - February). Control of blast disease by using chemicals and by the selection of resistant varieties is being assessed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0328, MECHANISM OF DORMANCY IN THE SEED OF THE OIL PALM

J.A. ODETOLA, (NI.270.0043)

Objective: Elucidation of the exact mechanism of the dormancy in oil palm seeds.

Approach: (a) Examination of seeds for inhibitors. (b) Testing by effect of growth promoter on seed germination. (c) Finding out any mechanical effects of seed parts on germination.

Progress: Preliminary results show that all growth-promoters tested, including the classical hormones, GA etc., as well as ethrel, and many other chemicals do not promote germination of the oil palm seed.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0329, GERMINATION PROBLEMS OF EXTENSION WORK OIL PALM SEEDS

J.A. ODETOLA, (NI.270.0044)

Objective. To improve the large-scale germination of Extension Work oil palm seeds.

Approach: (a) By seeking means of reducing the 80-day heating period required to break seed dormancy. (b) By finding ways of shortening or eliminating the 14 day seed soaking period. (c) By insuring high initial seed viability prior to treatment for germination. (d) By improving seed screening techniques.

Progress: Phase (b) of the project has been completed: seed soaking in water has now been completely eliminated; (c) has also been completed. In this case methods of seed processing and storage prior to pretreatment for germination have been improved so that initial seed viability has increased. Some progress has been made under phase (a) but investigations are still continuing. Under

phase (d) seed screening by floating in water, visual observation, and chemical tests have been developed into routine procedures, but studies continue.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0330, PHYSIOLOGICAL BASIS FOR YIELD IN THE OIL PALM

T. MENENDEZ, (NI.270.0045)

Objective: Determination of the physiological basis for yield differences among oil palms.

Approach: (a) Determination of rates of dry matter accumulation in palms with different yield potentials. (b) Determination of rates of CO2 uptake by palms with different yield potentials. (c) Determination of rates of sugar and total carbohydrate accumulation in palms with different yield potentials. (d) Determination of rates of mobilization of photosynthates in palms with different yield potentials.

Progress: Phase (a) has been completed showing no correlations between yield and rate of dry matter accumulation. Phase (c) has been partially completed. No significant differences in rates of reducing sugar accumulation among palms with different yield potentials, but trend existed in which high yielders appeared to be of lower sugar status. Phase (d) is just beginning and phase (b) has not yet started.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0331, RELATION OF FLOWERING TO YIELD IN THE OIL PALM

C.O. OBASOLA, (NI.270.0046)

Objective: Determination of methods of improving the yield of the oil palm through flowering.

Approach: (a) Study of environmental factors affecting sex ratio. (b) Influence of external hormonal application on sex ratio.

Progress: (1) Preliminary studies with 2, 4, 5-TP indicated that treatment with this hormone does not appear to increase yield. (2) A large body of data on flowering observations which have accumulated over several years is being examined and summarized in order to throw more light on seasonal variations of sex ratio and yield, and the question of exact time of sex initiation and differentiation.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0332, INTERNAL MARKETING OF PALM OIL AND PALM KERNELS

P.R. HERINGTON, (NI.270.0047)

Objective: To ascertain the extent of distributive and marketing arrangements for palm produce in Nigeria.

Approach: Local market investigations against the background of marketing-board proposals including information on prices, storage, transport and consumer preference. The application of utility analysis to the marketing decision.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0333, THE MARKET FOR PALM WINE IN NIGERIA

P.R. HERINGTON, (NI.270.0048)

Objective: To determine the extent of the market for palm wine in the Eastern and Midwestern States of Nigeria.

Approach: Survey of wine bars and markets in principal urban areas to gauge size of palm wine market and draw conclusions on both demand and supply relationships, distributive systems and prices.

Progress: Continuing.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

9.0334, THE WORLD MARKET FOR PALM OIL AND PALM KERNELS

P.R. HERINGTON, (NI.270.0049)

Objective: To maintain a continuous appraisal of trends in world market supply of and demand for palm oil and kernels. Particular reference to Nigeria's market share.

Approach: (A) Historical and (future) trend estimate analyses in the light of the total world market for edible fats and oils. (B) Implications for Nigerian palm produce exports with respect to (1) Britain's proposed entry into the E.E.C. (2) Planned and implemented production programmes in other areas. (C) Simultaneous equation approach to the determination of production, supply and demand relationships for the Nigerian oil palm industry.

Progress: Under completion.

SUPPORTED BY Nigerian Inst. for Oil Palm Res. - Benin

NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE

P.M.B. 5044, Ibadan

9.0335, ORIGINS OF MOULD ATTACK ON STORED COCOA BEANS

J.O. OYENIRAN, (NI.221.0001)

OBJECTIVE: To improve the quality of Nigerian cocoa beans. The origins of mould attachment on stored cocoa are being investigated in detail starting with fermentation and followed to drying and storage. Some records of fungi present at various stages have been produced. Suggestions on improved handling of cocoa during fermentation have been made as a result of initial work.

SUPPORTED BY Nigerian Stored Prod. Res. Inst. - Lagos

9.0336, TO REDUCE STORAGE LOSSES IN FRESH AND DRIED YAMS

S.A. ADESUYI, (NI.221.0002)

OBJECTIVE: With object of finding ways of preventing deterioration and weight loss of yams in storage. Investigations on methods of inhibition of sprouting and rot in yams will continue. Studies of possible methods of controlled insect attack in dried yams will be investigated.

APPROACH: Some investigations relating to prestorage conditioning using temperature, humidity and irradiation techniques have been reported.

Surveys of infestation levels and moisture contents of dried yam slices are in progress.

SUPPORTED BY Nigerian Stored Prod. Res. Inst. - Lagos

9.0337, ORIGIN OF MOULD DETERIORATION OF PALM KERNELS

F.O. KUKU, (NI.221.0003)

Objective: To reduce the level of mould growth on stored palm kernels. The present approach is to determine when palm kernels first become mouldy. A difference in conditions and spe-

cies of mould has been found in various parts of Southern Nigeria.

SUPPORTED BY Nigerian Stored Prod. Res. Inst. - Lagos

NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE

P.M.B. 3032, Kano

9.0338, AFLATOXIN - ASSESSMENT OF ANALYTICAL TECHNIQUES FOR USE UNDER LOCAL CONDITIONS

A.H. QURESHI, (NI.222.0001)

The techniques devised in the United Kingdom and the United States are to be compared in suitability for use under local conditions in Nigeria.

The most suitable method is to be adopted for monitoring the local groundnut crops.

SUPPORTED BY Nigerian Stored Prod. Res. Inst. - Lagos

NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE

Lagos Branch, P.M.B. 12543, Lagos

9.0339, INSECTICIDE TESTING PROGRAM

F.O. AYENI, (NI.220.0001)

Studies on fenitrothion, baythion and bromophos will be continued to determine their suitability as alternatives to iodophenphos and dichlorovinphos in terms of effectiveness and cost when used on concrete walls of warehouses against Trogoderma granarium and Tribolium castaneum.

SUPPORTED BY Nigerian Stored Prod. Res. Inst. - Lagos

NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE

P.M.B. 5063, Port Harcourt

9.0340, QUICK DETERMINATION OF FREE FATTY ACID CONTENT IN PALM KERNELS

S.O. SOWUNMI, (NI.223.0001)

A quick method of chemical assessment of free fatty acid in palm kernels in the field is required. Studies are to be made of existing visual techniques based on discoloration and visible damage and also the possibility of adopting a rapid chemical method.

SUPPORTED BY Nigerian Stored Prod. Res. Inst. - Lagos

SAVANNA FORESTRY RESEARCH STATION

P.M.B. 1039, Samaru, Zaria, North Central State

9.0341, HYBRIDIZATION IN EUCALYPTUS

G.O. OJO, (NI.151.0001)

Objectives: To study the spontaneously occurring hybrids of eucalyptus in Nigeria, and to investigate the use of artificially produced hybrids in afforestation.

Approach: (l) Comparative plantations of F1 hybrids with each of the parent species. (2) Development of controlled pollination techniques. (3) Eventually, production of hybrids by controlled pollination.

Progress: Work began in 1965. (a) Experimental graftings of the E. torelliana x E. citriodora hybrid on to root-stocks of its parents have been made, and progeny from open pollinated hybrid trees have been established in small plantation plots. (b) Plantations of widely separated mother trees of (1) E. saligna and (2) E. grandis in a matrix of E. tereticornis, with a view to obtaining F1 hybrids by natural pollination was established in 1969. (c) Similar plantation of E. torelliana in a matrix of E. citriodora was established in 1969.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0342, FOREST TREES PROVENANCE TRIALS

J.K. JACKSON, (NI.151.0002)

Objectives: To compare the survival, growth rate, stem form and wood qualities of different provenances of species of actual or potential value for plantations.

Progress: Work was begun in 1965. Through 1968 trials have been made of Eucalyptus microtheca, E. camaldulensis, E. pilularis, Pinus caribaea, P. khasya, P. oocarpa and Tectona grandis. In 1969 provenance trials of E. tereticornis, E. saligna, E. grandis, E. maculata, E. citriodora, E. decaisneana, E. alba and Pinus merkusii and additional provenances of E. camaldulensis and Pinus caribaea were planted.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0343, VEGETATIVE PROPAGATION OF PINUS SPECIES

G.O. OJO, (NI.151.0003)

Objective: If the very promising growth of some species of pines in the savanna region continues, there will come a stage when selection of elite trees for seed orchards, and experiments in controlled pollination and hybridization will be necessary. For these purposes it is necessary to graft scions of selected trees on to other stocks. Thus investigation of techniques of grafting pines under savanna conditons is needed. There are also some prospects of using vegetative propagation of pines from shoot cuttings, in the establishment of plantations.

Approach: (i) further work on cuttings and needle fascicles will be done when the results of the preliminary work are known. (ii) Grafting techniques will be studied.

Progress: Initiated in 1967, with trials of propagating pines from needle fascicles. These failed owing to the absence of mist-spray equipment. Some preliminary experiments on grafting of pines were made in 1968 with a certain amount of success. Preliminary work on the establishment of trees from cuttings and from needle fascicles began in January 1970 in growth chambers. The use of auxins to promote root development is being investigated.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

NIGERIA

9.0344, NATURAL REGENERATION IN SAVANNA WOODLAND

J.K. JACKSON, (NI.151.0004)

OBJECTIVES: (a) To study the effect on regeneration of Northern Guinea savanna woodland to various treatments of: early-burning, fire exclusion and cultivation after felling. (b) To study the influence of the above treatments on the productivity of the site.

Progress: Remeasuremens made in 1966 confirmed earlier evidece of the very severe effect of early-burning after clear-felling on both stocking and yield. In contrast the prevention of fire for ten years after felling resulted in basal area at the end of that period greater than that of the unfelled woodland.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0345, COMPARISON OF POTTING MIXTURES FOR NURSERY STOCK

J.K. JACKSON, (NI.151.0005)

Objectives: To determine the best potting mixtures for raising seedlings in nurseries, and to investigate the effect of different soil fumigants.

Progress: For Eucalyptus the best results were obtained from mixtures of sand and cow-dung, with added superphosphate. Added urea was beneficial in some cases. For pines the best mixtures were of deciduous forest topsoil and sand, with added superphosphate. Cow-dung was harmful to pines, as was urea at the higher concentrations.

Experiments on the use of soil sterilants ("Nemagon" and "Dowfume") showed that the Nemagon increased mortality when germinating seed was picked out one week after fumigant treatment. When picking out was delayed three weeks after fumigation there was no difference in mortality, but height growth on the fumigated soil was significantly better. Experiments to find out the best way of inoculating pine seedlings with mycorrhiza was started in 1970.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0346, TYPE AND SIZE OF CONTAINERS FOR RAISING NURSERY STOCK

J.K. JACKSON, (NI.151.0006)

Objective: To determine the effect of containers of various sizes and types on the growth of seedlings in the pots and their subsequent establishment and growth in the field.

Progress: Work initiated in 1966 with Eucalyptus camaldulensis and continued in 1967. Results to date indicate that survival of seedlings planted out from pots 6 ins. x 2 ins. in diameter does not differ significantly from that of seedlings in pots 9 ins. high x 3 ins. diameter. Height growth however tends to be better in plants raised in larger pots. Comparison of clear and black polythene pots for raising pine seedlings showed better seedling height growth in the black pots. The clear pots also disintegrated rapidly from the effects of sunlight.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0347, SAVANNA FORESTRY RESEARCH STATION

J.K. JACKSON, (NI.151.0007)

Objectives: To investigate methods of increasing percentage germination, and reducing the time taken for seeds to germinate of different species used in afforestation.

Progress: Initiated in 1967 with teak. Best results obtained so far are from alternate soaking in water for a day, and drying in the sun for a day, repeated for fourteen days. Rotation with sharp gravel in a concrete mixer also shows some promise. Vermiculite gave better results in the pregerminaton of Pinus caribea seed than did sand, but germination in partial light and in darkness was the same. Araucaria cunninghamii seed on the other hand had better germination in partial light than in darkness.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0348, EFFECT OF REMOVAL, PARTIAL REMOVAL AND NON-REMOVAL OF POLYTHENE POTS ON PLANTATION SPECIES

J.K. JACKSON, (NI.151.0008)

Objectives: To determine the effect on root development early growth and establishment of Eucalyptus camaldulensis, E. citriodora and different species of trees, of different degrees of pot removal and non- removal.

Successful establishment of Eucalyptus in plantation in Nigeria is dependent on prevention of termite attack on the young plants. This attack takes place mainly at the root-collar. Retention of part or all of the polythene pot after planting may help to prevent such attack; non-removal of the pot may considerably reduce planting costs.

Progress: Initiated in 1964 with three species of Eucalyptus at Miango. A second experiment with three species of Eucalyptus was laid down at Afaka in 1966. One on Pinus caribaea was estabblidhed in 1968. So far little effect of the different treatments has been observed, but results from other parts of the world indicate that the effect of non- removal of pots may be delayed until the trees have reached a fairly large size.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0349, TREE SPECIES ELIMINATION TRIALS

G.O. OJO, (NI.151.0009)

Objectives: To select from possible plantation species those sufficiently suited to the local conditions to warrant more exact and prolonged comparative trials.

Progress: Sudan zone: work initiated in 1960. On the more favourable sites with higher groundwater levels and fertility a number of exotics have proved successful but on less favourable sites only neem and some indigenous species have succeeded so far.

Further trials will be undertaken in cooperation with local forestry services and assessments will continue.

Guinea zones: Assessment will continue on some plots which still yield useful results. One new species Pinus occidentalis will be tested.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0350, PLANTATION TRIALS

J.K. JACKSON, (NI.151.0010)

Objective: Species which may be suitable for use in afforestation are first screened by being planted in small plots of 25 trees (species elimination trials) or 100 trees (species growth trials). The next stage is to plant them under conditions more closely resembling those which will be used in practice in larger afforestation programmes, and for this purpose small plantations of about one acre each are envisaged.

Progress: The present programme began in 1967 at Afaka with plantations of five species of Eucalyptus and Acrocarpus fraxinifolius. In 1968 small plantations of Pinus caribaea, P. oocarpa, and P. khasya were established at Bida, Nimbia (2 sites), Mokwa (3), Afaka and Rafin Bauna. Work started in Dogon Daji (Sanga River Forest Reserve) with four species, Tectona grandis, Gmelina arborea, P. caribaea and P. oocarpa.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0351, ESTABLISHMENT OF SEED ORCHARDS
G.O. OJO, (NI.151.0011)

Objectives: To establish seed orchard plantations for the purpose of producing high quality seeds of selected and tested provenances and species of trees adapted for forestation of a variety of Savanna sites.

Progress: A seed orchard of a desirable provenance of Eucalyptus camaldulensis was established in 1969. This was followed in 1970 with desirable provenances of E. camaldulensis, E. tereticornis and E. cloeziana. Large blocks (up to three acres) of P. caribaea and P. oocarpa were also planted out.

As the results of existing provenance trials become available seeds of the best provenances will be imported and orchards established. Species considered now are Pinus caribaea, P. oocarpa, P. merkusii and P. khasya and Eucalyptus maldulensis, E. tereticornis, E. saligna, E. grandis and P. citriodora would be imported for seed orchard establishment when results of the present provenance trials become available.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0352, ESTABLISHMENT OF ACACIA NILOTICA AND ACACIA SENEGAL
G.O. OJO, (NI.151.0012)

Objectives: To determine the best methods of establishing plantations of acacias.

Approach: Collate information available in Nigeria and in literature. Choose sites for experiments. This work is to be initiated as time and staff situation permit.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0353, INCREMENT RATES IN NATURAL SAVANNA WOODLAND
J.K. JACKSON, (NI.151.0013)

Objectives: To study the increment rates of the natural woodland species under a regime of annual early burning.

Knowledge of increment rates is essential for planned management of the forest estate, of which the Northern Guinea Savanna, at present managed under a regime of annual early burning, forms a major part.

Progress: Initiated in 1955. Results show growth rates to be extremely low, the mean annual girth increment of Isoberlinia doka during its fastest period (11 to 12-1/2 inches girth class) being only 0.25 inches. The mean annual basal area increment per acre is also extremely low (less than 0.5 square feet) and in one 3/4 acre plot the total basal area of living trees was less at the end of the four year measurement period than at the beginning, despite recruitment of just over 100 small stems.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0354, GROWTH AND YIELD OF TEAK (TECTONA GRANDIS)
J.K. JACKSON, (NI.151.0014)

Objectives: (a) To determine site quality clsses from temporary and permanent sample plots of teak in the savanna regions. (b) To prepare growth and yield tables. (c) To correlate growth with the site conditions found on each plot.

Progress: Preliminary work was begun in 1966 but because of the disturbances, military movements, and lack of personnel planned work had to be postponed. In 1968-69 a number of sample plots were measured and new ones established. In 1969-70 sample plots were remeasured and new ones established. Collection of soil samples.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0355, GROWTH AND YIELD OF GMELINA ARBOREA
J.K. JACKSON, (NI.151.0015)

Objectives: (a) To determine site quality classes from temporary and permanent plots of Gmelina in the savanna regions. (b) To prepare growth and yield tables. (c) To correlate growth with the site conditions found on each.

Progress: Available information on the growth of Gmelina in savanna areas has been collected. In 1969-70 all establishment plots were remeasured and new ones established. Soil samples and data on climate were collected.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0356, CULTIVATION AND WEEDING METHODS IN PLANTATIONS
T.G. ALLAN, (NI.151.0016)

Objectives: (a) To investigate the effect on seedling establishment and growth of variations in time and frequency of weeding, and effectiveness of weed control. (b) To determine the effect of weeding and not weeding the rows. (c) To compare different kinds of mechanical cultivators in terms of effectiveness of weed control. (d) To ascertain costs involved in different weeding methods. (e) To determine if mulching seedlings after cultivation affects growth and survival.

Approach: Experiments will be made to compare the effects of different cultivation techniques, such as the use of the rotavator compared with disc-harrowing and hand weeding. Pines and Eucalyptus will be used.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0357, CHEMICAL WEED CONTROL IN PLANTATIONS, NURSERIES AND FIRE LANES
V.M. NAIR, (NI.151.0017)

Objectives: To investigate the effectiveness and costs of various weedicides in the control of weeds (a) competing with trees in plantations and in nurseries and (b) in fire lanes (fire breaks) in order to keep the fire lanes from choking with grass and other annual and perennial weeds.

Progress: Preliminary trials were made in 1968 with simazine and gramoxone. In 1969 research plots have been established and treated at Afaka, Kano and Nimbia, employing five different chemicals at various dosages. Additional research plots will be established in different climatic and vegetation zones, employing a wide range of chemicals including phenoxy compounds, triazines, substituted ureas like diuron, and chlorinated aliphatic acids like Dalapon, et cetera.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0358, ELIMINATION OF UNWANTED LOW GRADE HARDWOOD TREES FROM FOREST STANDS AND PLANTATIONS
V.M. MAIR, (NI.151.0018)

Objectives: (a) To determine if unwanted hardwoods can be eliminated from forest stands and plantation by use of chemicals (weedicides and sylvicides). (b) To determine the efficiency of various chemicals in the killing of cull trees. (c) To determine the cost and labour involved in these operations. (d) To determine the

rates and time of application of chemicals in relation to age and species differences.

Progress: Poisoning of some unwanted low grade hardwoods have already been started in Afaka using cacadelic acid applied with an automatic hypo-hatchet.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0359, WATER STRESS IN RELATION TO GROWTH AND SURVIVAL IN SEEDLINGS OF EUCALYPTUS AND SOME INDIGENOUS SAVANNA SPECIES

M.A. OGIGIRIGI, (NI.151.0019)

Objectives: To study (a) how growth of seedlings of various species are related to atmospheric and soil moisture conditions; (b) the relation between leaf water deficit, leaf diffusive resistance and plant water potential on the one hand, and growth in height, diameter, leaf area, roots and dry matter accumulation on the other; (c) the critical soil moisture and leaf water deficit beyond which the seedlings cannot survive; (d) the relative water economy of seedlings of various species.

Progress: Preliminary studies of leaf water deficits and growth have been made for E. robusta, E. propinqua and E. cloeziana. An agitated diffusion porometer has been obtained and its characteristics determined. A modified Scholander pressure chamber (bomb) is being tried also. Leaf water deficit studies made at bi-weekly intervals show how deficits vary with season and time of day.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0360, GROWTH OF SEEDLING TREES IN RELATION TO VARIATIONS IN TEMPERATURE, LIGHT INTENSITY AND PHOTOPERIOD

M.A. OGIGIRIGI, (NI.151.0020)

Objectives: (a) To study the development and growth of shoots, roots and foliage of seedlings of different tree species showing adaptation to planting sites in the savanna. (b) To determine how growth and development are affected by variations in temperature, light intensity and photoperiod. (c) To compare growth and development under controlled environment conditions with that obtained on different natural sites varying in elevation and latitude and to define the temperature, light and photoperiod requirements of the species.

Approach: The first investigation planned is to find out the effect of temperatures corresponding to day and night temperatures at Mokwa, Afaka and Miango. Later on other environmental factors such as humidity and light intensity on growth of seedlings will be investigated as well.

Progress: The three Sherer-Gillett growth chambers were put in operating condition in 1969 but due to fluctuating electric supply could not be operated continuously. A project work plan has been developed and work will start as soon as there is adequate current.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0361, BUTT AND ROOT ROT OF TEAK (TECTONA GRANDIS)

Z.O. MOMOH, (NI.151.0021)

Objectives: Control of the root and butt rot disease of teak.

Progress: The extent of the damage and some of the factors responsible have been surveyed. Efforts directed towards the control have started. Rigidoporus (Fomes) lignosus has been proved to be the causal organism.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0362, MYCORRHIZAL ASSOCIATIONS IN PINES

Z.O. MOMOH, (NI.151.0022)

Objectives: To investigate the possibilities of improving mycorrhizal associations of pines with a view to enhancing the establishment and growth rates of them.

Progress: Temperature has already been found to be of great importance in mycorrhizal infection of pines. Excessive temperatures kill mycorrhizal fungi and prevent successful establishment of pine seedlings. Various experiments will be conducted with a view to ensuring successful mycorrhizal associations and improving on the existing mycorrhizal status of pines.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0363, SITE EVALUATION FOR PLANTATION DEVELOPMENT IN THE SAVANNA REGION

A.B. MOMODU, (NI.151.0023)

Objectives: To carry out site evaluation in selected Forest Reserves to determine which soils will be suitable for plantation development. To determine the soil water budget under a range of vegetable covers and to relate this to plantation species and to establishment technique. To determine these chemical properties of savanna soils which can be correlated with site quality or plant requirement.

Approach: Soil Survey. Record ground water movements. Use of neutron probe to determine soil water budgets. Soil and plant analysis.

Progress: A range of soils have been examined and analysed. Soils have to be related to tree growth. A range of soil water budgets have been determined and related to tree cover and climate. Chemical analysis has indicated the need for using certain fertilizers.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0364, PLANTATION SILVICULTURE IN THE SAVANNA REGION OF NIGERIA

T.G. ALLAN, (NI.151.0024)

Objectives: To provide the bases to allow the selection and afforestation of suitable areas to meet the anticipated wood requirement of the savanna zone. To determine suitable tree species for forestry plantation development and to determine cultural measures necessary for optimum growth. To determine effective and economic measures to secure maximum sustained yield from selected plantation species.

Approach: Species and Provenance Trials. Research into nursery and establishment methods. Pilot plantings of selected species with comparative trials of establishment. Investigation of any pathogens.

Progress: Satisfactory, a range of species have been selected as promising for particular parts of the savanna region, and work at plantation and pilot trial level continues.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

9.0365, STUDIES OF BEHAVIOUR AND GROWTH OF SELECTED PLANTATION SPECIES

J.K. JACKSON, (NI.151.0025)

Objectives: To carry out mensurational studies on selected established species on a periodic basis to provide data relevant to possible large scale plantation development. To make detailed studies of growth of selected species, and to determine the growth physiology, including methods of propagation of such species.

Approach: For mensuration - a broad approach to growth studies and the establishment and recording of permanent sample

plots and some evaluation of mensuration techniques. For Physiology dendrograph measurements and seasonal growth patterns. Plot experiments and the evaluation of propagation techniques. Experiments on water stress. Collection of climatic data.

Progress: Physiology well established and some detailed work completed. Main work now on propagation and root studies. Mensuration making steady progress but still in early stages.

SUPPORTED BY Forest Res. Inst. of Nigeria - Ibadan

SOIL FERTILITY UNIT AT NIFOR

Benin City, Mid Western State

9.0366, LONG TERM SOIL FERTILITY RESTORATIVE PROPERTIES OF NATURAL BUSH, TREE, GRASS AND LEGUME FALLOWS

V.G. KALAMKAR, (NI.133.0001)

OBJECTIVE: To compare the soil fertility restorative properties of two and three year fallows of Acioa bartesi, Pueraria phaseoloides, Panicum maximum and natural bush as measured by two years' cropping cycle (early maize, cassava and late maize) and soil chemical analysis.

APPROACH: Randomized complete block design with split-plot treatments to study, the effect of supplementary NPK fertilization in combination with all other treatments (balanced for phase comparisons); 3 replications. Sub-treatments include NPK fertilizer application on split-plot basis as follows: (1) 'Nil' fertilizer to the fallow and to the test crop. (F) NPK fertilizer (20:20:20) to the fallow only one year after establishment. (FC) NPK fertilizer to the fallow one year after establishment and also to each test crop during each cropping cycle. (C) NPK fertilizer to each test crop during the cropping cycle. In addition to comparing the yield of the crops obtained after the various lengths of fallows, the experiment is designed to provide information on: (a) The ability of different fallows to absorb the nutrients from sub-soil and re-distribute them in the surface horizon as revealed by soil chemical analysis. (b) The percentage of organic matter contributed by Acioa bartesi as compared to grass and legume fallows. The land will be prepared for cropping by mechanical cultivation between the rows of cropped Acioa bartesi.

PROGRESS: Acioa bartesi and other forms of fallows seem to improve the soil fertility substantially. Soil chemical properties under Acioa fallows have shown better nutrient reserves. However, the fertility appears to decline sharply within two to three years after the fallows are opened. Full statistical evaluation of the data obtained so far is awaited before any interim conclusions could be drawn.

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0367, MAIZE HERBICIDE TRIAL

A. WILLIAMS, (NI.133.0002)

National Network Project, see N1.131.0078. (9.0276)

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

UMUDIKE AGRICULTURAL RESEARCH STATION

Umudike, East Central State

9.0368, MAIZE HERBICIDE TRIAL

A. WILLIAMS, (NI.135.0001)

National Network Project, see NI.131.0078. (9.0276)

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

UYO AGRICULTURAL RESEARCH STATION

Uyo, South Eastern State

9.0369, MAIZE FERTILIZER TRIAL

F.K. ADEYEFA, (NI.134.0001)

National Network project, see NI.131.0077. (9.0275)

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

9.0370, MAIZE HERBICIDE TRIAL

A. WILLIAMS, (NI.134.0002)

National Network Project, see NI.131.0078. (9.0276)

SUPPORTED BY Federal Dept. of Agri. Research - Nigeria

PHILIPPINES

THE INTERNATIONAL RICE RESEARCH INSTITUTE

Los Banos, Laguna

10.0001, AGRONOMIC STUDIES ON IRRIGATED, RAINFED LOWLAND AND UPLAND RICE

S.K. DEDATTA, (RP.821.0001)

Promising selections from the Institute's breeding program are being evaluated under irrigated, rainfed lowland and upland conditions.

Nitrogen fertilizers and methods of application are evaluated under rainfed conditions.

Studies on soil moisture stress involve the development of techniques for screening rice varieties for tolerance. Techniques for greenhouse and field screening are being developed.

Other cultural practices under study are weed control, water management and direct seeding. All new herbicides are first tested under rainfed conditions and only when a herbicide shows enough promise under this condition is it tested under irrigated conditions. Studies on rotational irrigation are being extended to other areas with different soil and climatic conditions. Studies on direct seeding of rice are being continued because with successful control of weeds with $ herbicides, direct seeding can replace transplanting in many areas.

2, 4-D, a cheap herbicide is becoming rapidly adopted as a pre- emergence herbicide for controlling annual weeds (sedges, grasses and broadleaved weed) in transplanted rice. BASF 3510 (Bentazon) was identified as a potentially inexpensive herbicide for the control of Scirpus maritimus, a perennial sedge.

The IR-442 line was identified as adapted to growing under upland as well as deep water (up to 60 cm) conditions.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0002, IDENTIFICATION AND ALLEVIATION OF ON-FARM CONSTRAINTS TO INCREASED RICE PRODUCTION

R. BARKER, (RP.821.0002)

In the investigation of factors constraining the growth in rice yields, emphasis is placed on developing an approach for measuring and analyzing the multitude of factors influencing farm yields.

The studies being conducted are changes in rice farming in selected areas of Asia; a benchmark survey of rainfed farms in Bulacan and Nueva Ecija, Philippines: technologic change and rural employment; optimal resource allocation from production functions; and water management. Irrigation and water management have, from earlier studies, been identified as major constraints to the adoption of improved technology.

Studies show that inadequate weed control on many farms greatly reduce the yield response to fertilizers and the economic benefits of high yielding varieties. The level of insect control normally used at the experiment station is too costly for the farmer and knowledge of appropriate farm level insect control measures, other than use of resistant varieties, is almost completely lacking in rural areas.

Preliminary results indicate that even in the better irrigated areas of Asia there is a wide variation in the performance of the new rice technology.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0003, BIOLOGY, ECOLOGY AND CONTROL OF RICE INSECT PESTS

M.D. PATHAK, (RP.821.0003)

The research program is oriented towards developing a system of pest control that is easy to follow, less expensive and has minimum of toxicity and environmental pollution problems.

Varieties are evaluated for their resistance particularly to the brown planthopper, green leafhopper, white-backed planthopper and the rice whorl maggot.

Insecticides are evaluated in the laboratory and the greenhouse against the green leafhopper, the brown planthopper and the striped borer. The effective ones are tested in field experiments. Methods of insecticide application are being evaluated; e.g. root-soak treatment and the placement of the desired quantity of the insecticide in the root-zone of the rice seedling (about 2.5 cm below the soil surface).

Ecological studies on the green leafhopper and the brown planthopper include evaluation of the influences that environmental factors have on the population dynamics of the pests; survey of pest fluctuations, measurements of flight behavior and a comparison of sampling techniques.

Studies on integrated control include a test of simple integration of variety and pesticide; survey of predators in plots with insect- resistant selections; effect of insecticides on predators; effective timing of pesticide application and control through curative chemical treatment at economic injury level.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0004, FIELD TESTING OF NEW RICE TECHNOLOGY AND ADOPTION OF THE NEW TECHNOLOGY THROUGH A PILOT EXTENSION PROGRAM

V.E. ROSS, (RP.821.0004)

Field testing of the new technology is done in cooperation with various Philippine agencies. The studies include farmers evaluation of new selections applied research trial (FENSART); IRRI new selection applied research trial (INSART); insect control pilot study (IPCPS) and granular herbicide applied research trial (GHART).

Trials are being conducted to field test new technology under rainfed conditions of growing rice. The technology being tested are promising selections and varieties; herbicides; insecticides; rates and timing of fertilizer application; methods of stand establishment and different management levels.

The pilot extension program is being undertaken to determine the effects of the new technology when applied on a whole farm basis. The program was designed to effect a widescale adoption of the package of cultural practices at a rapid pace using a minimum number of highly skilled, action-oriented farm management technicians.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0005, AGRICULTURAL EQUIPMENT DEVELOPMENT RESEARCH FOR TROPICAL RICE CULTIVATION
A.U. KHAN, (RP.821.0005)

The major objectives of the project are the design, development, testing and extension of agricultural machinery for use by small-and medium-scale rice producers and processors in the tropics.

An improved tiller (4-6 hp power tiller) design was released to two manufacturers in the Philippines.

The following machinery/equipment are in various stages of design, development and evaluation: 1. Multicrop, axial flow thresher, 2. PTO thresher, 3. Stripper harvester, 4. Batch drier, 5. Rice, hull furnace, 6. Direct flame drier, 7. Heated-sand drying and parboiling machine, 8. Individual-row hopper paddy seeder, 9. Table thresher.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0006, STUDIES ON THE ROLE OF SOIL MICROBES IN SOIL FERTILITY AND RICE CULTURE
T. YOSHIDA, (RP.821.0006)

The ultimate goal is to find out ways in which soil microbes can be made to contribute to improved and efficient techniques of rice production.

Studies include those on microbial nitrogen fixation in rice plants and soils; atmospheric nitrogen fixation by legumes; transformation of fertilizer nitrogen in rice soils; microbial mineral transformations; organic matter applications in paddy soils and on pesticide residues.

More nitrogen gas was found in submerged paddies planted to rice than in unplanted paddies. An association between the soil and the rice plant in the rhizosphere appears to be a key factor in nitrogen fixation.

Residue analysis showed less than 10 ppb BHC in soils, 0-350 ppb in rice plants and neglible amount in irrigation water. Analysis was done in rice soils of Iloilo province in the Philippines. The herbicide, 2, 4-D was biodegradable and did not persist in two Philippine soils.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0007, DEVELOPMENT OF IMPROVED RICE VARIETIES
G.S. KHUSH, (RP.821.0007)

The breeding program places emphasis on disease and insect resistance, protein content, grain quality, varying growth duration, cold tolerance and upland traits. Several modifications of breeding procedures are undertaken in line with the concept of an integrated approach towards the achievement of the objectives. The breeding program coordinates its activities with other disciplines and draws upon their expertise in formulating the complex screening procedures attendant to the development of superior varieties.

The Institute have released five varieties (IR8, IR5, IR20, IR22 and IR24). In addition, there are 20 varieties developed from IRRI lines by research institutions in 13 different countries. Selections with improved plant type and excellent grain quality which combine resistance to blast, bacterial leaf blight, tungro virus, grassy stunt virus, brown planthopper and green leafhopper are now available.

Rice germplasm is being collected, preserved and evaluated for use in the breeding program. At the end of 1972 the IRRI germplasm collection consisted of 22,830 accessions.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0008, STUDIES ON THE IMPROVEMENT OF FIELD PLOT AND SAMPLING TECHNIQUES FOR RICE
K.A. GOMEZ, (RP.821.0008)

The objective is to assist scientists in other disciplines of rice research in improving their research methodologies. The kinds of studies conducted include the identification of sources of additional soil heterogeneity in rice experimental fields; identification of factors affecting experimental error of important rice characters. Field plot techniques for crops used in multiple cropping; pot techniques for greenhouse experiments; and experimental techniques suitable for farmers fields are also being studied. The variability in protein content of rice and the variability in yield response to nitrogen are being investigated. The efficiency of certain experimental designs and data analyses for researches at IRRI are under evaluation.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0009, PHYSICO-CHEMICAL AND BIOCHEMICAL STUDIES ON THE STARCH AND PROTEIN OF RICE
B.O. JULIANO, (RP.821.0009)

The studies on grain protein are brown rice protein analysis of samples from the breeding materials; nitrogen balance studies in healthy pre-school children using three samples of milled rice; and a study of the cause of higher lysine content in two varieties (ARC 10525 and Kolamba 540). Ammonium and nitrate metabolism in rice plants and the factors affecting protein accumulation in developing grains are likewise being studied.

A number of experiments are underway to identify factors other than amylose content that affect cooking and eating quality of rice. Examples are the investigation on molecular properties of starch granules of five waxy rices in relation to the quality of the parboiled waxy rice flakes (pinipig) produced; study on the nature of Basmatitype elongation; and determination of factors affecting changes in grain texture during storage.

Studies on starch synthesis include the characterization of soluble starch synthetases and the effect of sucrose concentration on starch accumulation and on the enzymes involved.

An increase in the protein content of the rice grain from the usual 7 percent to 9 or 10 percent did not have any adverse effect on the eating quality of rice. An increase in percentage of utilizable protein results from an increase in protein content in milled rices up to 10 percent.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

PHILIPPINES

10.0010, BIOLOGY, ECOLOGY AND CONTROL OF VIRUS, FUNGAL AND BACTERIAL DISEASES OF RICE

S.H. OU, (RP.821.0010)

Among the virus diseases the emphasis is on the tungro virus. Experiments are conducted to better understand the epidemiology of the tungro disease; e.g., studies on the acquisition of the virus, movement of the insect vector; influence of the number of insects on rate of transmission and studies on vectors at the IRRI research farm and vectors in farmer's fields. An improved method for screening varietal resistance is being developed.

The more important fungal diseases being studied are the blast disease and sheath blight. The resistance of different selections/-varieties is tested in international uniform blast nurseries. Sheath blight has recently caused a great deal of concern in many rice growing countries. The disease tends to become more destructive as rice culture becomes more intensive. Studies on sheath blight include lesion formation the perfect stage of the fungus; host range; varietal resistance and chemical control.

The objective of the bacterial disease research program is to assist in the integrated program of developing varieties with resistance to bacterial diseases. To meet the objective, simultaneous research is being conducted on the pathogen's virulence, the ecology of the pathogen and disease epidemiology. The emphasis has been on bacterial leaf blight and bacterial leaf streak.

In addition, work is underway to build up higher levels of resistance; multiple sources of resistance to specific diseases, and multiple diseases resistance.

New and more efficient screening techniques were developed for bacterial leaf blight and tungro. Sheath blight is becoming increasingly important in Indonesia.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0011, DEVELOPMENT OF IMPROVED CROPPING PATTERNS FOR SMALL ASIAN RICE FARMS

R.R. HARWOOD, (RP.821.0011)

The main objective is to achieve optimum utilization of farmer resources (rainfall, irrigation, land, labor, capital).

Studies include trials of intensive systems, relay cropping, insect control, weed control, maximum cropping studies, cropping patterns for rainfed areas, stability of cropping systems, and varietal introduction and testing. Included are economic studies on power source, labor requirements, and cost-return of cropping patterns.

There will be developed a better understanding of cropping patterns, their limiting factors and how we might improve on them. The individual components such as promising intercropping combinations and new methods of insect and weed management have real promise for immediate and effective use by farmers.

Studies revealed significant effects of crop combinations on insect and weed population. When peanuts were interplanted with corn under conditions of heavy corn borer infestation, the population of corn borer larvae was one-sixth of that in corn without interplanting of peanuts. Grain yield of an early corn variety was increased when mung bean was interplanted because the mung bean reduced weed growth without competing severely with corn.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0012, CHEMICAL KINETICS OF RICE SOILS AND VARIETAL RESPONSE TO ADVERSE SOIL CONDITIONS

F.N. PONNAMPERUMA, (RP.821.0012)

The chemical kinetics of soils profoundly influences the growth and yield of rice and provides a better understanding of the performance of rice on problem soils. Combined with soil and plant analysis and with plant observations chemical kinetics is a valuable diagnostic tool in the study of problem rice soils. Among the problem rice soils being studied are mesic soils, acid lateritic soils, acid sulfate soils, alkali soils and saline soils.

Varieties and selections are tested for resistance to aerobic soils, alkalinity, salinity, iron toxicity, excessive soil reduction and phosphorus deficiency.

Zinc is becoming an important yield limiting factor on large areas well supplied with major plant nutrients and with water.

There are differences in varietal resistance to iron and phosphorus deficiency, manganese, aluminum and iron toxicity, alkalinity and salinity. It is now possible to launch a breeding program to combine the resistance of these varieties to adverse soil conditions with other desirable characters to produce genetic lines that may be well suited to injurious soils.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

10.0013, STUDIES ON PHYSIOLOGICAL BASIS FOR FURTHER INCREASE OF GRAIN YIELD AND RESPONSE OF RICE TO SUB-NORMAL CLIMATIC ENVIRONMENT

S. YOSHIDA, (RP.821.0013)

Attempts to further increase grain yield involve studies on the role of CO2 released from the soil on crop photosynthesis; the effect of climate on grain number and grain yield; the rate limiting steps in rice photosynthesis and photosynthetic differences among rice varieties. Investigations on plant-water relations include the response of stomata to moisture stress; tests on heat resistance and studies on leaf water potential.

The response of varieties and lines to photoperiod and to complete submergence are determined. Varietal resistance to low temperature at the seedling stage and the influence of potassium fertilizer on seedling resistance are also being studied.

An intensive effort to characterize varieties planted under upland conditions is being undertaken.

CO2 enrichment before flowering increased yield by 30 percent by increasing grain number and grain weight. In the search for varieties with high photosynthetic rates, it was found that net assimilation rate varied by nearly 100 percent among varieties.

SUPPORTED BY Internat. Rice Res. Inst. - Manila, P.I.

SENEGAL

CENTRE DE RECHERCHES ZOOTECHNIQUES DE DARA-DJOLOFF

B.P., Dara

11.0001, IMPROVEMENT OF MILK PRODUCTION BY CROSSING THE LOCAL ZEBU BREED WITH IMPORTED SIRES

J.P. DENIS, (SG.132.0002)

Objective: Improvement of milk production in Senegal.

Approach: Classical milk inspection for the females. Use as sires of bulls that are the issue of better-yielding cows. Continuous crossing of the local zebu with imported sires (Pakistani-Guzera). Progeny testing.

Results: Isolation of lines having a more plentiful milk production. Knowledge of the milk production of the 1/2, 3/4 and 7/8 bloodstock.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

CENTRE EXPERIMENTAL DE GUEDE

c/o Project de la Recherche Agronomique, B.P. 154, Dakar

11.0002, FORAGE CROP EXPERIMENTATION

A. CZILLER, (SG.801.0001)

Detection of high-yielding forage species susceptible of adaptation to irrigated cultivation in the Senegal river valley.

Permanent species: Pennisetum sp., Panicum maximum, Echinochloe sp., Brachiaria mutica, etc.

Seasonal species: Maize, forage sorghum, Eleusine, Melinis menutiflora, Chloris gayana, etc.

Legumes: Stylosanthes sp., Mucuna, Desmodium sp., Vigna sp., Soja sp., Pueraria etc.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0003, RESEARCH ON VARIETIES OF VIGNA UNGUICULATA WITH GOOD RESPONSE TO INTENSIVE TECHNICS (WATER, FERTILIZERS)

A. CZILLER, (SG.801.0002)

VARIETAL SELECTIONS

YIELD: 1.5 ton of grain/ha, or 25 to 40 ton of green forage.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0004, STUDY OF WATER REQUIREMENTS OF COTTON UNDER IRRIGATION

A. CZILLER, (SG.801.0003)

No summary has been provided to the Smithsonian Science Information Exchange.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0005, EXPERIMENTS WITH MAIZE AND SORGHUM

A. CZILLER, (SG.801.0004)

Varietal studies: Detection of high-yielding varieties suitable for cultivation in winter, the cold dry season, and the hot dry season, respectively. Production of grain and forage. Study of cropping techniques and irrigation methods.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0006, RESEARCH ON WHEAT AND BARLEY

A. CZILLER, (SG.801.0005)

Objective: Varietal study - 1) Detection of high-yielding varieties of fast-growing hard and soft wheat; 2) Cropping and irrigation methods; 3) Manuring problems; 4) Study of bakery technology in association with the Dakar Institute of Food Technology.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0007, IMPROVEMENT OF IRRIGATED AGRICULTURE IN THE SENEGAL RIVER VALLEY

A. CZILLER, (SG.801.0006)

OBJECTIVE: Definition of possible ways to establish in the Senegal river valley a high-yielding irrigated agriculture, with progressive incorporation of modern livestock raising (lower valley ecological sector).

APPROACH: Agronomic experimentation in irrigation districts with total water control: varietal selection, cropping techniques, crop diversification trials.

PROGRESS: Selection of adapted cereal varieties - detection of promising forage species.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0008, COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH

D.A. RIJKS, (SG.801.0007)

Measurement of rice field temperatures. Analysis of temperatures at different depths. During the cold period from December to February (in cold waves of 6 degrees C the rice field temperature falls to 12 degrees C), these relatively low temperatures arrest

the growth of the rice, whose growing time is lengthened by 45-50 days (from 110-120 to 160-170 days), which interferes with the obtaining of two crops per year.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0009, AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN

D.A. RIJKS, (SG.801.0008)

Analysis of the frequency and distribution of rain in a 10-day period at 13 stations in Mali, 5 in Mauritania and 2 in Senegal. Analysis of frequencies of dry and hot winds that can hinder the growth of irrigated crops in February, March, April and May. Evaluation and verification of empirical coefficients used in the different formulas for calculating evapotranspiration. Analysis of frequency of cold waves. Continuous measurements of solar radiation and net radiation. Evaluation of their relationship to the duration of insolation. Verification of values of coefficients in the Angstrom and Brunt formulas.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

11.0010, WATER REQUIREMENTS OF IRRIGATED CROPS

D.A. RIJKS, (SG.801.0009)

Measurement of water consumed by crops of wheat, maize, sorghum, niebe (Vigna unguiculata) and rice in the course of their growth. Use of lysimeters and of a neutron probe.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

CENTRE NATIONAL DE RECHERCHES AGRONOMIQUES DE BAMBEY IRAT

B.P., Bambey

11.0011, ANALYSIS OF FACTORS OF CROP YIELD IN A PEASANT ENVIRONMENT

C. RAMOND, (SG.151.0001)

Objective: To measure the penetration of technical subjects in a peasant environment and to calculate their effect on yields. To define on behalf of the body responsible for extension some priorities for diffusion of subjects.

Approach: Factorial analysis of technical factors of the yield on a large number of plots closely followed. Complementary analyses of groups of plots classified according to different criteria. Calculation of multiple regressions.

Results: When all the techniques are correctly applied, the yields obtained by the peasant farmers are obviously identical to those obtained on the station. But financial or technical constraint (insufficient equipment, or poor use made of that available), or shortage of labor, make this difficult to achieve.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0012, ECONOMIC ANALYSIS OF PEASANT FARMERS' HOLDINGS

C. RAMOND, (SG.151.0002)

Objective: Research on the most appropriate method of analysis aimed at leading up to a management council.

Approach: Factorial analysis of holdings, group analysis, automated budgets, function of production. Factorial analyses and group analyses utilized conjointly enable a satisfactory evaluation of the economy of the holdings. Automated budgets will eventually be used to lead up to the management council.

Results: Factorial analysis allows a great number of technical and economic but also sociological variables to be accounted for. Their regrouping as independent factors, factors of dimension, intensification, influence of the introduction of a new culture. . .allows for the separation of tendencies and for calculation of the intensity of relationships between explained variables and explanatory variables.

For a better interpretation of the phenomena, the factorial analysis is prolonged by comparative analyses and regression analyses.

These analyses, if they provide a good description of a group of holdings, do not, however, end as models for decision. To this end the method of automated budgets will be tested from 1973 onwards.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0013, STUDY OF THE MOLD DISEASES OF THE PANICLES OF SORGHUM

J.C. GIRARD, (SG.151.0003)

Objective: To aid the selector in finding early varieties of sorghum resistant to mold diseases.

Approach: To construct an inventory of mold diseases on the various lines of cultivated sorghums: To follow the development according to the relative humidity of the air and of the moisture content of the seeds. To grow them in pure culture. To carry out artificial inoculations of sorghum seeds to enable marking of the possible resistances.

Results: Inventory of the mold diseases on different lines of sorghum.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0014, STUDY OF THE MILDEW OF MILLET DUE TO SCLEROSPORA GRAMINICOLA

J.C. GIRARD, (SG.151.0004)

Objective: To acquire a good knowledge of the biology of the parasite and of its relations with the host such as to facilitate an effective control campaign against this disease.

Approach: Establishment of methods for artificial inoculation of millet with Sclerospora graminicola. Study of the biology of the parasite. Genetic study of the host-parasite relations. Study of control methods other than varietal resistance (this latter belonging to the province of the selector).

Results: Method of artificial inoculation.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0015, IMPROVEMENT OF THE PROTEIN CONTENT AND QUALITY OF THE PROTEINS OF MAIZE

J. DUROVRAY, (SG.151.0005)

Objective: While utilizing the introduced strains "opaque 2" and "Lg 2", to create varieties well adapted to the local conditions and having a high content of lysine and tryptophane.

Approach: The procedure is by crossing and back-crosses on composite individuals having among themselves a good aptitude for combination.

Eventually, among enriched composites, there will take place reciprocal recurrent selections for the specific aptitude for combination.

Results: Work in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0016, STUDY OF SORGHUM GALL-MIDGE - CONTARINIA SORGHICOLA

B. VERCAMBRE, (SG.151.0006)

Objectives: Agronomic and economic influence according to varieties and cropping associations proposed for popularization.

Approach: Account of the varietal differences for a single flowering cycle. Association of short-cycle and long-cycle varieties. Total form of the dynamics.

Results: Commencement of the studies.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0017, STUDY OF THE HARMFUL EFFECT OF WEEDS ON GROUNDNUTS

J.P. DEUSE, (SG.151.0007)

Objectives: To determine the influence of weeds on the productivity of groundnuts at the beginning of the growth cycle. To measure the loss of yield in that case, according to the date of the first weeding.

Approach: Total evaluation in the course of this first phase of the study, sum of the influences of every nature (moisture - light - mineral elements) due to the joint action of all the species of weeds.

In the course of a second phase the entire phenomenon will be analysed as a function of each of the main species of weeds.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0018, ENEMIES OF RICE - ESTABLISHMENT OF TECHNIQUES FOR REARING

B. VERCAMBRE, (SG.151.0008)

Objectives: To establish techniques for rearing, on artificial media, the principal Lepidoptera feeding on rice, to facilitate the study and multiplication of their entomophages.

Approach: Adaptation of the method already used for Chilo suppressalis and for Chilo zacconius.

Mass rearing of the parasites Trichospilus - Tetrastichus and Itoplectis.

Results: Commencement of study.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0019, STUDY OF THE CHEMICAL WEEDING OF GROUNDNUTS

J.P. DUESE, (SG.151.0009)

Objectives: Research on herbicides which answer the specific needs of the peasant environment in West Africa and notably in the ecology of the groundnut-growing zone of Sine-Saloum.

Approach: Tests of herbicides - normalized methodology.

Results: One herbicide can from now on be assayed for popular use. Treatment leaving room for improvement and, with this in view, pursuit of tests on herbicides.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0020, CHEMICAL CONTROL OF WEEDS OF THE SORGHUM CROP

J.P. DEUSE, (SG.151.0010)

Objective: Research on the most efficacious herbicides for the sorghum crop.

Approach: The method for experiments with herbicides is that of the French Commission for Biological Experiments, namely: behaviour test, test for selectivity, test for profitability and for acceptability in a rural environment.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0021, CHEMICAL CONTROL OF THE WEEDS OF THE MILLET CROP

J.P. DEUSE, (SG.151.0011)

Objective: Research on the most efficacious herbicides for the millet crop.

Approach: The method for experiments with herbicides is that of the French Commission for Biological Experiments, namely: behaviour test, test for selectivity, test for profitability and for acceptability in a rural environment.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0022, IMPROVEMENT OF THE STORAGE FACILITIES FOR AGRICULTURAL PRODUCE IN THE SAHELO-SOUDANESE ZONE

J.P. DEUSE, (SG.151.0012)

Objective: Improvement of the existing storage facilities, establishment of new techniques (chemical, physical, biological), studies of profitability.

Approach: Studies are carried out to establish new structures for storage. To this is added the establishment of new control techniques, whether chemical, physical or biological. Each study is subjected to a study of profitability, for the improvement of facilities must be such as to be easily popularizable in a rural environment.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0023, PROJECT F.E.D. 215

A.F. BILQUEZ, (SG.151.0013)

Objective: Creation of new varieties of millet of high productivity, suited to a modern agriculture and adapted to the environmental conditions of Senegal.

Approach: Transference of the dwarfism "d2" to varieties having among them a good aptitude for combination, with a view to obtaining plants corresponding to the ideal type defined by the physiologist. Selection for certain characteristics (resistance to diseases - type of plant).

Results: The obtaining of dwarf lines resistant to Sclerospora.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0024, CREATION OF HYBRID VARIETIES OF MAIZE

J. DUROVRAY, (SG.151.0014)

Objective: Research on a maximum heterosis effect between local varieties (pure or population lines) and introduced varieties (pure or population lines).

Approach: Systematic study of aptitudes for combination between introduced and local varieties.

Recurrent selection of "S1" lines in the local populations with a view to their improvement (yield, height).

Extraction of pure lines in the local populations with a view to creating double hybrids.

Reciprocal recurrent selection for the specific aptitude for combination between two composites with a wide genetic base.

Results: One complex hybrid (H.D. formed from introduced pure lines x improved local population) is being popularized at the moment. Its production potential is 6.5 t/ha.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0025, IMPROVEMENT OF SORGHUMS
J.P. MARATHEE, (SG.151.0015)

Objective: The obtaining of early and late varieties of reduced height and with good quality seed.

Approach: Prospection and selection in the local material; Introductions; Hybridizations between varieties having complementary qualities and genealogical selection; Utilization of the heterosis in sorghum for the creation of industrial hybrids.

Results: Popularization of the following varieties: 51.69 Introduced late variety, 56.63 Introduced semi-late variety, SH 60 CB-Semi-late variety selected from local material, 50.59 and 63.18 Early varieties selected from local material, CE90 Early variety created by hybridization and genealogical selection, popularized from 1973 onwards.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0026, MILLET - CREATION OF A DWARF COMPOSITE
J.P. MARATHEE, (SG.151.0016)

Objective: To create a dwarf, homogeneous composite, resistant to diseases and having good agronomic qualities.

Approach: Crossing between Indian dwarf lines and Souna Millet, followed by cumulative selection for the required characters.

Results: The composite is in the process of being improved.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0027, EFFECT OF TILLAGE ON THE MINERAL NUTRITION AND THE SUPPLY OF MOISTURE TO CROPS
R. NICOU, (SG.151.0017)

Objective: Ploughing has a very important effect upon the root growth of crops; besides, this effect can be more or less opposed to that of the mineral fertilizer especially when the latter is applied as a surface dressing. This antagonistic effect may have very important repercussions on the moisture supply to the plant especially when a period of drought intervenes in the course of vegetative growth. By appropriate techniques the question is to give the plant a root system which will enable it to make the maximum use of the moisture available in the soil, at the same time assuring a good mineral nutrition.

Approach: Studies in pots, experiments in the field, study of the rooting of the plants, inspection of the moisture and mineral nutrition.

Results: First fragmentary results: positive effect of ploughing (especially at the end of the cycle) on the resistance of the plant to drought; positive effect of burying the fertilizer in conditions of drought.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0028, PHYSICAL EVOLUTION OF THE SOIL UNDER CULTIVATION
R. NICOU, (SG.151.0018)

Objective: General study of the evolution of the soil under cultivation. This subject can assume three aspects: Physical evolution in the course of the regeneration of worn-out soil; Evolution of the soil under different cropping systems planted upon recently cleared land: determination of the best cropping system on new lands; Inspection of the physical evolution in intensive cropping systems.

Approach: Measurements and samplings in the fields: apparent densities, penetrometer recordings, cultural profiles, rooting, samplings of clods, reactions of plants: groundnut, millet, sorghum, maize, rice, cotton, vigna, soya bean, forage crops.

Laboratory studies on samples taken in the fields: granulometry, permeability, porosities, laboratory penetrometer, densimetric separations, assay for organic matter.

Results: Study in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0029, STUDY OF THE HARDENING OF SANDY SOILS WHEN DESSICATED
R. NICOU, (SG.151.0019)

Objective: This study should afford a better knowledge of the phenomena of hardening of sandy soils, and lead to the definition of appropriate cropping techniques to stabilize the cropping profile created by tillage and to prolong the period for use of the soil by means of dressings in the course of the dry season.

Approach: Studies in the laboratory: fine granulometries, apparent densities, porosity studies on clods and textural porosity, penetrometry in the laboratory, study of the specific surface of sands and loams, densimetric separations of the organic matter, coprecipitations, extraction of clays.

Studies in the fields: penetrometries, apparent densities, moisture profiles, traction forces, cropping profiles, reactions of the different plants to the physical properties of the soil (groundnuts, millet, maize, sorghum, rice, cotton, soya beans, vigna, forage crops).

Results: The first results demonstrate or confirm: the role of the nature of the clay on the phenomenon of hardening; the influence of the speed of desiccation at end of winter season; the role of organic matter in lessening hardening.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0030, INOCULATION OF SOYA BEAN SEEDS
G. CORRIEU, (SG.151.0020)

Objective: Study of the influence of inoculation with efficient strains on the yield of soya bean crops.

Approach: The inocula are manufactured, then tested in the laboratory; they are used for treating the seeds at the moment of sowing. The nodulation, spontaneous or resulting from inoculation, is observed at the time of flowering; the yield is calculated after harvesting. The efficiency of the nodules sampled is tested in the laboratory.

Results: The inoculation of soya seeds gives rise to a correct nodule formation, but at the time of the first campaign it has not been possible to demonstrate its effect on the yield.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0031, THE MOST FAVOURABLE CROPPING TECHNIQUES FOR THE NODULATION OF GROUNDNUTS
G. CORRIEU, (SG.151.0021)

Objective: Study of the influence of several cropping techniques on the nodule formation and the yield of Arachis plantations. Choice of a treatment that will make it possible to remedy yellow dwarfing disease.

Approach: The field experiments comprise a biennial rotation of Arachis - millet. The different treatments are working of the soil, the application of manure, the application of lime and coating of the seeds with lime. The observations are made in the period of growth or at harvest time: they concern nodule formation, the aerial portion and the root system (on the one hand), the yield, the weight of the seeds, the oil and protein content of the seeds on the other.

Results: The 1972 campaign comprises two preliminary experiments of this type. The project has been inspired by the mediocre results of a single inoculation and with the object of eliminating the causes of the yellow dwarfing previously observed on these same soils.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0032, HYDROCYANIC TOXICITY OF 63-I8 (A DWARF VARIETY OF SORGHUM)

M. MBODJ, (SG.151.0022)

Objective: The dwarf varieties of sorghum provide, after harvesting of the seeds, a straw that is 75-80 percent consumed by the oxen. The exploitation of these varieties for use as fodder, and at a less advanced stage of development may be envisaged. From that moment the problem of hydrocyanic toxicty found in young sorghum will have to be faced.

Approach: Study of the influence of mineral fertilization on the material used. The experimental arrangement is the blocks method with five treatments: N, P, K, NPK, and the untreated control.

The samples taken are assayed by argentimetry.

Results: Study in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0033, UTILIZATION OF COTTON-SEED IN THE NUTRITION OF FARM ANIMALS

M. MBODJ, (SG.151.0023)

Objective: Utilization of the by-products of crops in the feeding of farm animals for a more complete integration of rearing with agricultural production.

Approach: Distribution ad libitum of cotton-seed either crushed or whole, for study of the acceptability of the product (to animals). Comparative study of two types of concentrate, the one at 100 percent of crushed cotton-seed, the other at 25 percent of cotton-seed and 75 percent cereals, in the fattening of cattle.

Results: Study in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0034, THE FRUIT OF FAIDHERBIA ALBIDA IN THE NUTRITION OF CATTLE

M. MBODJ, (SG.151.0024)

Objective: Faidherbia albida grows in considerable density in Cayor-Baol and Serere countries (20-25 trees/ha). Its fruit is rich in proteins (70g dry nitrogenous matter/kg) and in energy (0.77 feed- units). It constitutes an important forage resource. The question is to study the level for its integration in fattening rations with the object of freeing a certain proportion of the cereals used for this purpose.

Approach: Comparative study of two types of concentrate, the one based on cereals, the other on .50 percent cereals and 50 percent Faidherbia fruit for the fattening of cattle. The animals undergo weight inspection every week.

Results: Study in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0035, EXPLOITATION OF GROUNDNUTS AS A FORAGE CROP

M. MBODJ, (SG.151.0025)

Objective: The 48.115 variety of groundnuts, in production as an industrial crop, has been shown to be a producer of dry matter at 72 days after the seeds come up.

The object of this experimental work is to study the behaviour of this variety (production of dry matter, faculty of regrowth and production of pods after mowing) when it is exploited as forage.

Approach: The experimental arrangement comprises four treatments: Mowing at 50 days; Mowing at 62 days; Mowing at 75 days; without mowing.

Each of the treatments is subdivided into 2 sub-treatments at the moment of harvesting the pods, the one harvested at maturity, the other left just as it is with the object of assessing the faculty for re- growth of this variety.

Results: Study in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0036, STUDY OF A MODEL FOR EXPLOITATION FOR ZOOTECHNICAL PURPOSES

M. MBODJ, (SG.151.0026)

Objective: To study the problems set by integration of agriculture with rearing, with the object of aiding the agricultural-pastoral producer to make better use of plant crops.

Approach: Utilization of the by-products of crops (millet and sorghum straw, and groundnut hulls) in such a way that the excess matter from cereals is used in the management of a paying sheep and cattle rearing establishment; the animals, purchased at the lowest market prices, are sold after fattening at the most favourable times.

Results: The integration of the animal into the agricultural business, at first without a speculative object, then after speculation, offers: intensive utilization of the soils, the use of harvest by-products in the fattening of the animals and the making of manure re- utilized in the regeneration of the soils.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0037, RESISTANCE TO TRYPANOSOMIASIS IN CATTLE ("METIS DE BAMBEY") BREED

M. MBODJ, (SG.151.0027)

Objective: To study the behaviour of the breed in the presence of trypanosomiasis, before distributing them in trypanosome-infected zones.

Approach: Experimental infection of animals of different ages by inoculating them with Trypanosoma congolense: To make blood smears each day to study the evolution of the infection. Study of the effects on weight gains of the animals by weekly weight recording. From the 10th day onwards, blood samples are taken each week for haematocrit and blood cell counts. This study is completed by the transfer of subjects to infested zones (Sine-Saloum and Casamance).

Results: Study in the course of being carried out.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

SENEGAL

11.0038, DEPRESSIVE EFFECT OF TURNING OUT TO GRASS ON THE GROWTH OF BOVINE ANIMALS

M. MBODJ, (SG.151.0028)

Objective: To find a technique of feeding capable of considerably reducing the depressive effect of turning out to grass, with the object of facilitating the indoor feeding of the winter season.

Approach: Study of the weight curves of groups of animals managed in the following ways: direct pasture feeding plus 2.5 kg of cereals; progressive pasture feeding for 20 days plus 2 kg of cereals plus hay: a) the hay is distributed before turning out on pasture, b) the hay is distributed after return from pasture. The loss of weight of the animals and the time needed for regaining their initial weight are measured.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0039, ADAPTATION OF MATERIAL FOR A POLYCULTIVATOR FOR ANIMAL TRACTION

J. LECRAZ, (SG.151.0029)

Objective: Adaptation of a mowing system; Adaptation of swathing system; Adaptation of water-cask, half-carried; Adaptation of towing platform, half- carried.

Approach: Creation of prototypes, testing of these prototypes.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0040, STUDY OF A SOWING-HOEING OF GREAT BREADTH, FOR ANIMAL TRACTION

J. LECRAZ, (SG.151.0030)

Objective: To try to obtain a machine at a low price, capable in team cultivation of working a breadth of 1.80 metres for a lower price than the current machines.

Approach: Completion of a first prototype. Prototype completed and is in the course of testing (on the bench, in the field).

Results: 1) Machine has advantages. 2) Mechanical behaviour presenting weaknesses.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0041, TESTS IN TRUE SIZE OF A PROTOTYPE FOR A MILLET THRESHING MACHINE

J. LECRAZ, (SG.151.0031)

Objective: Establishment of a threshing machine for millet, with a large turnover.

Approach: The prototype produced seems satisfactory at the moment. A test of long duration is necessary, however, in order to find out its real possibilities and its weaknesses.

Results: Study in progress. The present turnover is 800 kg of seed per hour for an installed 25 horse-power engine and an essential mean of 15 h.p. The losses and breakages are slight.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0042, CROPPING TECHNIQUES FOR SANDY SOILS DRYING OUT AFTER FLOODING

J. LECRAZ, (SG.151.0032)

Objective: To define the best method for preparation of the seed- bed.

Approach: The experiment is constituted by a group of observation plots. Combination of periods for tilling according to humidity. Determination of the tilling implement according to the crop to be sown (arachis or millet).

Results: Study in progress. These experiments will probably be pursued for many years to obtain reliable results.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0043, IMPROVEMENT OF THE TECHNOLOGICAL CHARACTERS OF ARACHIS FOR OIL PRODUCTION

J.C. MAUBOUSSIN, (SG.151.0033)

Objectives: To render the product in commercial use (groundnuts in their shells) the most suitable for producing the oil.

Approach: Increase of the yield on shelling by reducing the thickness of the shell by hybridation and genealogical selection. Research for varieties having a large oil content in the seed by testing the varieties created. Research on varieties with regular pods with regard to shape and maturation, by genealogical selection for this character.

Results: The obtaining of lines with 78 percent yield of seed/-shell, of which one has been popularized.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0044, CREATION OF VARIETIES OF DORMANT GROUNDNUTS HAVING A SHORT CYCLE (90 DAYS) OR A SEMI-SHORT CYCLE (105 DAYS)

J.C. MAUBOUSSIN, (SG.151.0034)

Objectives: For the North Central region of Senegal, varieties of this type are essential; they do not exist naturally.

Approach: Recombination of the dormancy of the late varieties with early cycles, varieties by hybridization followed by genealogical selection.

Results: 2 varieties (released) for popular use, several others promising.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0045, GROWTH AND MATURATION OF GROUNDNUTS IN SANDY SOIL

J.C. MAUBOUSSIN, (SG.151.0035)

Objectives: Study of 7 very different varieties of groundnuts with the object of acquiring a better understanding of varietal behaviour; relation to climatology.

Approach: Cropping with repetitions, samplings "staggered" in time, measurement of different variable factors in growth and maturation of the pods, evolution of the foliage, nodosity.

Results: Interpretation in progress directed towards an understanding of the relationship between plant and climate.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0046, STUDY OF VARIETIES OF TOMATO RESISTANT TO NEMATODES

J.C. MAUBOUSSIN, (SG.151.0036)

Objectives: To study the behaviour of varieties resistant to very aggressive populations of Meloidogyne in different conditions of cultivation.

approach: Cultivation in the fields with follow-up of the evolution of the attacks.

Results: Activity in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0047, CREATION OF VARIETIES OF GROUNDNUTS RESISTANT TO DROUGHT

J. GAUTEREAU, (SG.151.0037)

Objective: To create new varieties capable of resisting lengthy periods of drought during the vegetative cycle.

Approach: Marking of resistant varieties among the varieties introduced or created on other criteria. Laboratory testing, experiments in natural and artificial conditions of drought. Hybridization

between parents whose resistance is known and donors of other characters.

Results: Several interesting varieties detected.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0048, STUDY OF BEHAVIOUR OF VARIETIES OF POTATO

J.C. MAUBOUSSIN, (SG.151.0038)

Objective: To know the behaviour of varieties in different conditions of cultivation in the interior of Senegal.

Approach: Comparative experiments or behaviour studies.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0049, BEHAVIOUR STUDY WITH VARIETIES OF EGGPLANT

J.C. MAUBOUSSIN, (SG.151.0039)

Objective: To know the behaviour of varieties in different conditions of cultivation in the interior of Senegal.

Approach: Comparative experiments or behaviour studies.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0050, STUDY OF THE STUNTING OF GROUNDNUTS (CLUMP)

J.C. MAUBOUSSIN, (SG.151.0040)

Objective: To determine the vector that transmits the disease.

Approach: Research done in common by the "Institut de Recherches Agronomiques Tropicales" (IRAT) and "Office de la Recherche Scientifique et Techique Outre Mer (ORSTOM). Study of disinfection of the soil and of the mechanism of the appearance of the disease in the fields. (IRAT). Laboratory studies on the nematodes. (ORSTOM).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0051, STRUCTURES FOR USE IN TEAM CULTIVATION

J. MONNIER, (SG.151.0041)

Objective: Study in "life-size" in the agricultural stations of Senegal, of models of farms theoretically defined. To determine means of production in voluntarily limited conditions (simulation of a production unit): 1. The actual possibilities of applying the proposed techniques, 2. The economic effect of the application of these techniques.

Approach: National network project. Determination of the standard times for tasks. Determination of the blocks and sub-blocks of tasks. Determination of the days available for the different operations of cultivation within the blocks and sub-blocks of tasks. Detailed study of the constraints of labour and of the constraints for the personnel.

Results: Standard times for tasks, blocks and sub-blocks of tasks for each crop. Definition of the days available for each category of tasks. Establishment of accounts in agricultural concerns.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0052, DETAILED SOCIO-ECONOMIC SURVEYS OF INTENSIVE PRODUCTION CONCERNS

J. MONNIER, (SG.151.0042)

Objective: Possibilities of actual application of the proposed production techniques. Economic influence of the application of these techniques. National Network Project.

Approach: These surveys are especially concerned with the detailed study of the labour factor which is of primordial importance. The study at the national level in the application environment itself enables precise measurement of the psychosociological constraints and their influence on the application of the techniques. The study at the level of the production unit enables the establishment of a true account of the concern and to separate the net profit of the undertaking or subsidiary undertakings for each individual. This profit makes it possible to determine the actual possibilities for investment.

Results: Determination of the blocks and subsidiary blocks of tasks in a farming environment. Definition of the notion of "active person": characterization of the work of men, women and children. Determination of the work available. Determination of the possibilities of investment in the production units studied.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0053, STUDY OF THE MODALITIES FOR CULTIVATION OF THE NEW VARIETIES (OF PLANTS)

J. MONNIER, (SG.151.0043)

Objective: to study in detail, on plots of one hectare, the work factor on new crops which require appropriate techniques and to determine the surface area which the new varieties may occupy in the plantation.

Approach: 1) National network project; 2) Definition of the appropriate techniques in team cultivation with oxen; 3) Time/-motion studies of the tasks as team cultivation with oxygen and as manual cultivation; 4) Definition of the level of mechanization of cultivation.

Results: Standard times for tasks - Definition of the date limits for execution of the tasks for the new varieties of vigna, millet, sorghum.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0054, STUDY OF LAND TENURE AND LAND CONSOLIDATION

P. KLEENE, (SG.151.0044)

Objective: The introduction of a modern technology is linked with an evolution of the existing land tenure. An attempt is being made to foresee the terms of this evolution and to establish a methodology for attaining it.

Approach: 1) National network project under the responsibility of the Ministry of Rural Development; 2) Preliminary survey: Cadastral survey, setting of boundaries, transmission of rights, demography; 3) Consolidation in limited areas.

Results: 1) Land consolidation of 200 ha. in Woloffarea; 2) Commenced land consolidation in Manding area.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0055, CREATION OF EATING VARIETIES OF GROUNDNUTS FOR CASAMANCE

J.C. MAUBOUSSIN, (SG.151.0045)

Objectives: Introduced varieties have not been a success in the ecology of Casamance; the necessary technological characters must therefore be transferred to good adapted varieties, if possible resistant to "rosette."

Approach: Hybridation and genealogical selection.

Results: Varieties at present under test in comparative experiments, correct from the technological point of view.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0056, AGRO-CLIMATIC KNOWLEDGE OF THE PRINCIPAL ZONES WHERE AGRONOMIC RESEARCH IS AP-

SENEGAL

PLIED

C. DANCETTE, (SG.151.0046)

Objective: To know the climatic factors influencing the production of plants and even of animals. To establish correlations between these factors and the agricultural phenomena studied. To contribute to the observations of the national meterological network. To select the data useful for the determination of the moisture requirements of crops and to calculate the level of satisfaction of these requirements.

Approach: Mustering of the data of the principal IRAT agricultural meterology stations of Bambey, Sefa, Richard-Toll and Djibelor; secondary stations at Nioro du Rip, and at Sinthiou Maleme; and of the numerous stations for recording of rainfall, administered by IRAT pre- popularization.

Result: 1) Detailed annual meteorological reports since 1964; 2) Agro-climatological descriptions of certain zones; 3) Studies concerning rainfall useful to agriculture and the determination of growth cycles to be recommended according to region; 4) Establishment of formulas for calculation of potential evaporation-transpiration.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0057, IMPROVEMENT OF THE NITROGENOUS FERTILITY OF THE SOIL BY APPLICATION OF ORGANIC NITROGEN

F. GANRY, (SG.151.0047)

Objective: Improvement of the fertility of soils by increasing the storage of organic nitrogen and study of the indirect effects of the organic matter of the soil on the nitrogenous nutrition of cereals.

Approach: 1) Study, over two years in bare soil in lysimeters, of the decomposition of different types of plant material from millet (green manure, straw, composted straw, roots alone). 2) Field study of the organic state of soil under continuous cultivation of millet (soil with or without burial of composted millet straw). The fertilizer applied, labelled with 15 N affords knowledge of the extent of biological storage of the nitrogenous fertilizer.

Results: 1) Lysimetric study for identical gross applications. The roots supply less nitrogen. The green manure liberates twice as much N at the beginning of the rainy season and 1.5 times as much in the second part of this season, as does straw; on the other hand, it acidifies the soil. The nitrogenous fertilizer at the rate of 200N has a depressant effect on the hydrolysable nitrogen (labile fraction) when the quantity of organic matter buried is insufficient (15 t/ha.) and a positive effect at the rate of 30 t/ha. 2) Field study: results not yet known.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0058, ANALYSIS OF SAP

A. MONTAGNE, (SG.151.0048)

Objective: The analysis of sap could enable a much more rapid and precise diagnosis of mineral nutrition than foliar diagnosis. This technique would make the analysis of plant material capable of providing information concerning the conditions in which plants utilize the ions absorbed, i.e., on the intensity of the phenomena implied in the process of nutrition. According to the published studies of W. Routchenko, the proportions of N and P, in mineral and organic form in the sap, enable a definition of the state of nutrition of the plant in these elements in proportion to its requirements. The establishment of this analytical method enters into the framework of the mineral nutrition programme and finds a direct application in the diagnosis of deficiencies, and in the fertilization of the affected zones.

Approach: The establishment of the method deals with millet cultivated on sand and flowing solutions. After extraction and fractionation of the juices, the method uses simple but sensitive analytical procedures (spectrophotometry and titrimetry) which have been developed by Delmas, Routchenko and Baudel (1959)

Results: The first experiments can be started towards the beginning of 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0059, MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM)

A. MONTAGNE, (SG.151.0049)

Objective: The measurement of the mineral uptake, with respect to each of the species studied, cultivated in different conditions of manuring and working of the soil, will afford knowledge of the mineral mobilizations and the amounts removed at harvesting, per unit of production. The object of this study is to obtain a better control of mineral nutrition and to calculate the maintenance fertilization needed for the different crops.

Approach: The programme covers millet, maize, rice, groundnuts and sorghum, cultivated in experimental fields, distributed over a central- southern sector of Senegal. The samplings are made at maturity, immediately before harvesting, each sample is subjected to several analyses: 1) measurement of humidity; 2) assay for N, P, K, Ca, Mg, S in the parts "exported" (seeds) and in the parts restored to the soil (straws).

Results: No results yet, the study extending over several years.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0060, NITROGENOUS NUTRITION OF CEREALS

F. GANRY, (SG.151.0050)

Objective: The object of these studies is: 1) to improve the return from the nitrogenous fertilizer (is the optimum return from the fertilizer improved in the presence of organic material?); 2) to study with the aid of labelled nitrogen (N15) the efficiency of fractionation of the nitrogenous fertilizer on the yield of the cereal.

Approach: In a pluriannual field experiment, increasing quantities of nitrogen are applied in the presence or the absence of composted straws. The labelled fertilizer provides knowledge of the efficiency of fractionation and the true coefficient of utilization of the nitrogenous fertilizer.

Results: (First results 1972) - As early as the first year we can demonstrate a specific effect of the organic matter on the yield.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0061, MOISTURE BALANCE BENEATH CUT CROPS, BARE SOIL AND FALLOW

C. DANCETTE, (SG.151.0051)

Objective: To know the terms of moisture balance under different types of cover (cut crops, bare soil, fallow) in order to work out a better general policy with regard to water: by the choice of species, of varieties having a longer or shorter cycle, by a better management of fallows; by a more rational distribution of the types of cover and finally by a choice of techniques of cultivation. One part managed in natural conditions and another irrigated to the optimum will enable judgement of the influence of rainfall on production (millet, groundnuts) for different purposes: adaptation to the environment according to its recorded rainfall, forecasts of

production.

Approach: Inspection of humidity by means of the neutron humidimeter, by measurement of the drainage, of the evaporation - transpiration, by inspection of vegetative growth and of yields in seed and dry matter.

Results obtained: Measurements of real evapotranspiration with millet, groundnuts, fallow and bare soil. Partial knowledge of the terms of moisture balance to capacity for retention, permanent withering, permeability, percolation, etc. Expected: Measurements of maximal evaporation - transpiration beneath the same types of cover and simultaneously with the measurements of real evaporation- transpiration.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0062, MOISTURE NUTRITION OF PLUVIAL RICE - RESISTANCE TO DROUGHT

C. DANCETTE, (SG.151.0052)

Objective: To know the water requirements of pluvial rice. To know its reactions in periods of drought and the influence of moisture stress on the yields. This knowledge should allow a choice of varieties taking the best advantage of the available possibilities of rainfall and an optimal adaptation of the varieties proposed, by climatic zones.

Approach: Study in pots and in a controlled environment (from the point of view of moisture applications especially). Moisture stress is provoked at different stages of cultivation. Regular observations are made concerning growth and development: Measurement of potential consumption for each of the principal climatic zones (use of evapotranspiration and of evaporation vats, class A); 2) Inspection of the actual amounts consumed in the field by means of the neutron humidimeter. Inspections under irrigation could eventually be envisaged. This study has just commenced. The first results of the 1972 winter season concern the first phase of study in a hot-house and in pots, and measurements of maximal evaporation - transpiration.

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SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0063, LEACHING OF THE MINERAL ELEMENTS FROM SANDY SOILS CULTIVATED AS INTENSIVE SYSTEMS

C. PIERI, (SG.151.0053)

Objective: In the sandy soils of Senegal the losses by leaching of the mineral elements can be important. They are closely linked to the moisture dynamics and the moisture economy in these soils. But this dynamics is in part a function of the types of cropping systems utilized (in particular with or without fallow). Some studies of leaching had been made under traditional cultivation and in the framework of improved extensive systems. Fresh studies must be undertaken to evaluate the importance of losses by leaching in the framework of the more intensive systems, by way of application to Senegal, in such a way as to establish realistic mineral balances, and consequently a fertilization policy enabling the conservation of the fertility acquired. Approach: The study is undertaken: 1) on a laboratory model with a view to establishing a relation between the volume (V) drained by water and the quantities (Q) of elements taken out; 2) on apparatus in the field (lysimeters) with inspection of the moisture dynamics (neutron humidimeter).

Results: The project is in its implantation phase but numerous data on water dynamics are already available.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0064, DETERMINATION OF THE AVAILABILITY OF POTASSIUM IN SOME SANDY SOILS IN SENEGAL

C. PIERI, (SG.151.0054)

Objective: This project in entered in a more comprehensive programme on the "Regulation of potassium in the cultivated soils of Senegal", which will be entered upon in its entirety in the years to come. In fact, numerous examples demonstrate the appearance of the deficiency in this element which becomes manifest particularly after 5 or 6 years of cultivation in intensive systems.

The establishment of a potassic fertilizer runs foul of certain difficulties connected in particular with disregard for the dynamics of this element in the soils of Senegal, and different problems connected with the assimilation of potassium by plants (excessive application, cationic interactions, etc). This project has as its objective the study of different forms of potassium participating in the nutrition of plants.

Approach: Two phases: 1) Methodological establishment in the laboratory of different assays: Total potassium, mobilizable K, exchangeable K, soluble K. 2) Evaluation in the laboratory and in the field of the store of potassium effectively placed at the disposal of crops.

Results: Methodological establishment in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0065, STUDY OF THE ACIDIFICATION OF CULTIVATED SOILS IN SENEGAL AND DETERMINATION OF THE REQUIREMENTS IN LIME

C. PIERI, (SG.151.0055)

Objective: Numerous signs indicate a decided tendency to acidification of the cultivated soils of Senegal. This is particularly clear in the North Centre of Senegal, where the groundnut crop is in some places affected with yellow dwarfing. The relation between the low pH values (less than 5) and this affection has been established (D. Blondel et al.). The present project has as its objective: 1) To determine the importance of this phenomenon in agricultural Senegal; 2) To define the requirements in lime of these acid soils in order to correct the acidity.

Approach: 1) An inventory of the affected zones is being undertaken, and will be systematized from 1973 onwards. Attention is drawn to quantity of exchangeable aluminum and and the level of saturation in aluminum of these acid soils; A threshold of toxicity of exchangeable aluminum for certain common varieties of groundnuts will be defined. 3) The research on the requirements in lime will be based on the study of the quantities necessary for the neutralization of the exchangeable aluminum. Experimental tests in the fields will be set up in the different affected zones.

Results: The first results obtained show that certain soils have high levels in exchangeable aluminum. A first approach to definition of the requirements in lime has been made.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0066, STUDY OF CONTINUOUS CULTIVATION

G. POCTHIER, (SG.151.0056)

Objective: As the surface areas devoted to fallows are greatly decreasing in the regions of Thies, Diourbel and in Sine-Saloum, it has seemed necessary to estimate the levels of yield in continuous cropping and with fallow and to study the problems set by continuous cropping (techniques, fertilization, evolution of weeds.) Approach: 1) Comparison of different rotations at two levels of fertilization; 2) Putting large plots under continuous crop-

ping, and following these up by studies under the main research disciplines. Setting up different experiments on these plots; 3) Balance of the uptake by the crops and study of the evolution of the soils.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0067, INVESTIGATIONS OF REVENUES AND EXPENDITURE OF FARMS

P. KLEENE, (SG.151.0057)

Objective: The question is to make a qualitative and quantitative analysis of the budgets of farms or of households, considered as independent units of consumption and production. The study comprises especially: 1) the attribution of revenues per individual and then by social status; 3) revenues other than those coming from the sale of harvests, farm (rearing) products, secondary activities and crafts, hiring and usury; 4) the possibilities of investment in the farm.

Approach: Investigation on 6 farms at Thysee-Kayrour, daily visit of the investigator, measurement of the surface area of the production.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0068, MANAGEMENT COUNCIL FOR FARMS

P. KLEENE, (SG.151.0058)

Objective: Technical activities aim at rapid transformation of farming in the direction of intensification. Starting from technical norms obtained by research, the question is to study how and in what rhythm the different concerns could comply with this modernization. Finally it must lead to precise recommendations on investigations to be made and the norms to be applied for each type of concern in the usage of popularization.

Approach: Studies of cases, observations and measurements of all factors and means of production of the concerns followed. Setting down the data on forms, analyses and advice to the farmers in collaboration with the staff. Results: 20 farms have received advice and have been followed up; 120 farms will be advised and followed up in 1973/1974.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0069, STUDY OF THE BORERS OF MILLET - ACIGONA IGNEFUSALIS

B. VERCAMBRE, (SG.151.0059)

Objective: Biological and dynamic study on early, late, traditional and dwarf types of millet; Study of the parasite Syzeuctus sp.

Approach: Establishment of the technique of rearing on semi-artificial medium; Technique of rearing of the parasite Syzeuctus; Preliminary experiments on controlled infestation of strains of dwarf millet.

Results: Commencement of studies.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0070, INTRODUCTION OF CHEMICAL WEED DESTRUCTION INTO THE PRODUCTION STRUCTURE

G. POCTHIER, (SG.151.0060)

Objectives: To verify if, technically and economically, the chemical weed destruction established at the station is applicable by the farmers; To study the repercussions of this technique on the whole of a concern.

Approach: Chemical weeding of groundnuts and maize; Measurement of the time of the operations and the costs on farms on which all the variable factors are known.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

DIVISION CTFT DES RECHERCHES PISCICOLES

B.P. 28, Richard Toll

11.0071, DETERMINATION OF THE PRODUCTIVITY (OF FISH) OF CONTINENTAL WATERS

C. REIZER, (SG.114.0001)

Objective: To know the possibilities of the various reaches of the Senegal river in order to propose a rational exploitation of fishing and to improve the techniques for catching fish without harming productivity.

Approach: Study on productivity by means of physico-chemical research on the surface and deep water, biological research on reproduction, growth and the seasonal displacements of the principal species.

Results: A programme for organization of the management of pisciculture in the Delta was proposed in 1971. The study of the halieutic possibilities of Lake Guiers will be finished in 1972.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0072, STUDIES ON THE FAUNA OF CONTINENTAL WATERS

C. REIZER, (SG.114.0002)

Objective: Establishment of faunistic data on the fresh-water species present in the Senegal river and in its tributaries. Besides its scientific interest, it will enable an approach to the fundamental notion of productivity and make it a concern for management.

Approach: The studies are being conducted in collaboration between the C.T.F.T. and the Laboratory of Zoology of the Faculty of Sciences, University of Dakar.

Results: The systematic revision of the Polypteridae, the Characinidae and the Mormyridae is completed.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0073, DETERMINATION OF PRODUCTION OF FISH OF CONTINENTAL WATERS

C. REIZER, (SG.114.0003)

Objective: To determine the production of fishes sampled in the Senegal river and in Lake Guiers.

Approach: The surveys are being conducted in collaboration with the Forestry Service at the principal commercialization stations. They are examined and interpreted by the C.T.F.T.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

LABORATOIRE DE RADIOISOTOPIE DU CENTRE DE RECH. AGRON. DE BAMBEY

B.P., Bambey

11.0074, FERTILIZER EFFICIENCY STUDIES ON SOYA BEAN AND GROUNDNUTS

F. GANRY, (SG.830.0001)

The object of this project is to see how best phosphatic and nitrogen fertilizers should be applied to grain legume crops without losing the benefits of their nitrogen fixing capacity. Field experiments will be designed to obtain answers to the following questions: 1. What is the influence of method, time and source of fertilizer application on the efficiency of fertilizer utilization? 2. What is the effect of fertilizer application on symbiotic nitrogen fixation? 3. What is the influence of other cultural practices such as irrigation and the liming of acid soils on the efficiency of fertilizer utilization and on nitrogen fixation?

In 1973 an experiment will be done to study the efficiency of different methods of placing superphosphate fertilizer and how this would interact with a small dose of starter nitrogen (30 kg N/ha as urea) and nitrogen fixation.

Using N15 labelled urea and P33 labelled superphosphate, the actual amounts of N and P taken up by the crop will be measured. The total nitrogen in the crop would be derived from fertilizer, soil and symbiotic fixation. The amount of soil N in the crop will be estimated by carrying out an experiment with N15 labelled urea on a non leguminous crop. Hence the fixed N can be estimated. Field observations will also be made to study the influence of various fertilizer treatments on nodulation and N fixation.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.
Internat. Atomic Energy Agency - Austria

LABORATOIRE NATIONAL DE L'ELEVAGE ET DE RECHERCHES VETERINAIRES

B.P. 2057, Dakar

11.0075, IMPROVEMENT OF THE PRODUCTION OF BEEF - EXTERIORIZATION OF THE GENETIC POTENTIALITIES OF SENEGAL FULANI (GOBRA) ZEBU CATTLE

J.P. DENIS, (SG.131.0001)

Objective: Determination of the possibilities of Gobra zebu cattle for beef production.

Approach: 1) Exteriorization of these possibilities by rational nutrition; 2) Weights and measurements of these animals; 3) Slaughter and inspection of the carcasses.

Results: Weight at six months, one year, two and three years largely superior: 126 - 249 - 490 - 634 (kg) respectively as against 96 - 144 - 296 - 364 for the males. Mean carcass yield of 63 percent at 2 years and 60 percent at 3 years - 54.5 percent at 11 months. Demonstration of the precocity of the Senegal Fulani (Gobra) zebu when it is given rational feeding.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0076, IMPROVEMENT OF THE PRODUCTION OF BEEF - SELECTION OF SENEGAL FULANI (GOBRA) ZEBU CATTLE

J.P. DENIS, (SG.131.0002)

Objective: Improvement of the production of beef cattle by selection of the Senegal Fulani (Gobra) zebu breed.

Approach: 1) Regular recording of weights and measurements of the animals from birth to adult age; 2) Establishment of criteria for selection at different levels; 3) Progeny test.

Results: Increase of weight at the different characteristic ages; improvement of precocity. Distribution to local breeding establishments of sires having superior performance.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0077, IMPROVEMENT OF THE PRODUCTION OF BEEF - STUDY OF THE SEXUAL CYCLE OF SENEGAL FULANI (GOBRA) ZEBU CATTLE

J.P. DENIS, (SG.131.0003)

Objective: Knowledge of the sexual cycle of Senegal Fulani (Gobra) zebu cattle for the setting up of an artificial insemination programme for a wider distribution of the performances of selected sires.

Approach: Determination of the age at first calving; of the intervals between calvings. Determination of the rhythm and duration of oestrus. Experimental synchronization of oestrus. Study of the bulls' semen.

Results: Mean duration of gestation: 292.3 plus or minus 4.9 days. Age at first calving: 1077 plus or minus 99 days in normal conditions, and 900 plus or minus 26 days in "exteriorized" (improved) individuals. Interval between calvings: 370 and 473.2 plus or minus 7.8 days according to nutritional conditions. Interoestral interval in heifers: 21.1 plus or minus 0.5 days. Duration of oestrus between 5 and 6 hours.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0078, PRODUCTION OF MILK AND REARING OF THE CALF

H. CALVET, (SG.131.0004)

Objective: In order to free the total production of milk for the benefit of human consumption on the one hand and to abolish the malnutrition of the young on the other, it is agreed to consider an early weaning and an artificial feeding of the calf.

Approach: As a first step, suitable rations for the calf are being studied, the rearing of the calf having to be compensated economically by an extended marketing of milk. As a second step, these techniques will have to be made the object of a "popularization" in "pilot units".

Results: One partial experiment has been carried out to date; in this it has been possible to obtain some animals weighing 400 kg at 2 years, starting from a ration costing about 40 francs a day.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0079, STUDY OF NATURAL PASTURES - EVOLUTION

J. VALENZA, (SG.131.0005)

Objective: Evolution of natural pastures.

Approach: Evolution of the botanical composition of some types of natural pastures of the Sahelo-Soudanian zone subjected to different influences. Inventory according to the "line" method. Analysis of the results.

Results: Demonstration of the preponderant influence of the recorded rainfall on the evolution of these pastures.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

SENEGAL

11.0080, STUDY OF NATURAL PASTURES - CARTOGRAPHY

J. VALENZA, (SG.131.0006)

Objectives: Mapping of the natural pastures of Senegal.

Approach: Composition, value and distribution of the different types of natural pastures of Senegal. Distribution map by photo- interpretation.

Results: Completion of: Map of North Senegal; Map of Eastern Ferlo; Map of South Ferlo; Map of the Senegal River Delta; Map of Upper and Middle Casamance.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0081, CULTIVATION OF FORAGE CROPS

R. CADOT, (SG.131.0007)

Objective: Intensive production of forage to ameliorate the nutritional conditions of the cattle of Senegal.

Approach: Search for forage species adapted to the different ecological conditions of Senegal. Definition of the mode of working for a maximal production.

Results: Establishment of a collection of 284 species of forage plants: 200 Gramineae, 75 Leguminosae and 9 varied.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0082, STUDY OF MINERAL DEFICIENCY COMPLEXES

H. CALVET, (SG.131.0008)

Objectives: Mineral deficiencies constitute a limiting factor for the productivity of herds in a tropical zone. The objective of the programme is to determine the elements responsible for the deficiency and to study the means adapted for controlling it.

Approach: In the first place surveys were made in the rearing zone in question. The object of these was the sampling of serum, of forage, of drinking-water; assays of the mineral elements and of trace- elements were made on these. Following this, a mineral supplementation was instituted for a certain number of herds in this zone and surveillance of their evolution was maintained for two consecutive years.

Results: A deficiency in phosphorus, calcium and copper was demonstrated in the dry season in the zebu herds of Northern Senegal. At the present moment an experiment for the popularization of mineral supplements is in progress in this region.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0083, BIOCHEMICAL DETERMINATION ON HERDS OF CATTLE AT THE DIFFERENT PERIODS OF THE YEAR

H. CALVET, (SG.131.0009)

Objectives: In the course of the annual cycle the animals have to adapt themselves to radically different environmental conditions. These adaptations must have repercussions on their principles of metabolism (water, protein, mineral) and be made conspicuous by periodic series of appropriate biochemical values. The objective of this research is to obtain a better knowledge of the tropical zebu (type of cattle) and of its faculties for adaptation to the environment.

Approach: The method consists in carrying out seasonal series of biochemical determinations on as broad a sample as possible.

Results: The results are in the course of being interpreted.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0084, IMPROVING THE PRODUCTION OF BEEF - INTENSIVE FEEDING

H. CALVET, (SG.131.0010)

Objectives: To increase the production of meat of the local breeds of cattle. To make use of the waste products of food crops and of industrial by-products. To establish efficacious and economically reasonable rations.

Approach: Experimental fattening of various categories of local zebu and Bos taurus; trial of various rations based on the main products and by-products locally available; inspection of growth.

Results: Proof of the possibilities of the gobra zebu (Senegal Fulani) breed for the production of beef. Gain of 700 to 1200 g/day with a low consumption index. Establishment of effective and economical rations based on groundnut shells or on rice straw.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0085, SEASONAL VARIATIONS OF THE PASTURES AND NUTRITION OF CATTLE

H. CALVET, (SG.131.0011)

Objectives: In extensive rearing the condition of maintenance of herds depends essentially upon two factors: The quantities of forage ingested daily, and the digestibility of these types of forage.

In Senegal these two factors are apt to vary in large proportions from one season to another.

In this research it is proposed to obtain average measurements for daily consumption and, at the same time, for the digestibility of the materials ingested in the course of each seasonal period and in each of the rearing zones.

Approach: The method employed requires indirect techniques using an external marker (Cr2O3) and an internal marker (lignin) for the forage materials.

Results: Commenced in 1972, the research work is at the stage of establishment of the methods which will be used in the field from 1973 onward.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0086, BALANCE FAVOURABLE TO THE EFFICACY OF RATIONS FOR CATTLE INTENDED FOR BEEF OR FOR MILK PRODUCTION

H. CALVET, (SG.131.0012)

The efficacy of a ration depends not only upon the substances of which it is composed but equally upon the principles (energy, nitrate and mineral) which it makes available to the animals.

Objectives: The objective of this research is to determine the proportions favourable to an optimum yield for each type of ration composed of products or by-products available in Senegal.

Approach: The research comprises two stages: Determination of the nutrients produced at the level of the rumen: The confirmation of these results by experiments on the animal.

Results: In 1971, studies have been made of rations utilizing rice straw. In 1972, formulations for rations composed essentially of groundnut haulm.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0087, BOVINE OCULAR THELAZIOSIS - TREATMENTS

S.M. TOURE, (SG.131.0013)

Objectives: Thelaziosis is a parasite infestation due to a Spirurid nematode, Thelazia rhodesi and transmitted by flies of the genus Musca (Musca sorbens). This verminosis in cattle leads to ocular infections of progressive severity: conjunctivitis, keratitis, blindness.

The objective is the control of this disease by the treatment of affected animals and the destruction of the vectors.

Results: Therapeutic measures applied: experimental treatments in Lower Casamance. Trials of treatment by the use of collyria based on Lugol's solution (1 per thousand), boric acid (3 percent), mercury cyanide (1 per 4000).

Tetramisole and piperazine adipate should also be tested.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0088, BOVINE OCULAR THELAZIOSIS - AETIOLOGY
S.M. TOURE, (SG.131.0014)

Objectives: Thelaziosis is a parasitic infestation due to a nematode transmitted by flies of the genus Musca. This verminosis in cattle leads to ocular infections of progressive severity: conjunctivitis, keratitis, blindness. The medium-term objective is to control the disease in all the rearing regions in order to lead to eradication.

Results: Systematic classification in the genus Thelazia: Thelazia rhodesi is responsible for the disease (Nematoda, Spiruridae). Demonstration of the vector role of the flies in the cattle enclosures - 20,000 flies dissected, percentage of infestation: 4 or 5 per thousand. Systematic classification of the vector flies: flies of the Musca sorbens group. Regional frequency: Casamance, Senegal River Region, Sine-Saloum, Upper Gambia (River). The other regions of Senegal will also be studied in epidemiological surveys (Regions of Thies, of Diourbel, Eastern Senegal).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0089, HELMINTHOSES OF FARM ANIMALS - TREATMENTS
S.M. TOURE, (SG.131.0015)

Objectives: Parasitic diseases caused by helminths severely affect farm animals in Senegal with very high percentages of infestation. This parasitism leads to considerable economic losses (retardations of growth, reductions in yield and mortality among calves).

The immediate objective is the control of helminthoses of cattle.

Results: Control campaign against distomatosis in Upper (Haute) Casamance. Use in the field of three modern anthelminthics lethal for flukes: 1) Nitroxynil; 2) Bitin-S; 3) Rafoxanide. Control of bovine ocular thelaziosis.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0090, HELMINTHOSES OF FARM ANIMALS - EPIDEMIOLOGY
S.M. TOURE, (SG.131.0017)

Objectives: Parasitic diseases caused by helminths severely affect farm animals in Senegal with very high percentages of infestation. This parasitism is very frequent and leads to considerable economic losses. These facts justify permanent research on the helminths of cattle to understand means of effective control.

Results: Systematic and biological studies: inventory of species of helminths parasitic in domestic ruminants; biological cycles and vectors; ecological factors; geographical distribution and epidemiology of helminthoses; economic influence (regions studied: Casamance, Senegal River Region, Sine-Saloum, Upper Gambia (River) Region). The other regions of Senegal will also be studied in epidemiological surveys (regions of Thies, Diourbel, Eastern Senegal).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0091, TRYPANOSOMIASES - IMMUNOLOGY
S.M. TOURE, (SG.131.0018)

The study of immunological phenomena may lead to the application of diagnostic procedures that can add to the store of knowledge of epidemiology. The methods of diagnosis being tested are that by immunodiffusion and by immunofluorescence. These studies are at their outset.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0092, TRYPANOSOMIASES - CONTROL CAMPAIGN AGAINST THE VECTORS
S.M. TOURE, (SG.131.0019)

Objectives: Some residual islets, situated not far from the capital (Dakar), harbour species of Glossina. A control campaign has been carried on in one of the residual islets (Niayes of Senegal). The species being attacked is Glossina palpalis gambiensis. The control operations have lasted for three years. Preparation used: Dieldrin at 2 percent; method: terrestrial spraying.

Results: The burrows sprayed have a linear extension of 160 km. At the latest surveys, there are no tsetse flies in the whole of the treated zones. Correlatively, cases of animal trypanosomiases have become very rare. Inquiries are being pursued concerning (human) sleeping-sickness.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0093, TRYPANOSOMIASES - TREATMENT
S.M. TOURE, (SG.131.0020)

Objectives: The relative frequency of the different species of trypanosomes must be known. This conditions the choice of the drug to be employed. In regions of severe endemicity, it is important to treat the animals regularly. As a preliminary to collective treatments, many experimental treatments must be carried out to specify the conditions for the use of trypanocidal drugs.

Studies completed: Relative frequency of the different species of trypanosomes. (a) Trypanosoma vivax, (b) T. congolense, (c) T. brucei, (d) T. evansi.

Trial of treatments using Phenanthridinium derivatives (Ethidium, Prothidium, Isometamidium). Dynamic study in vitro of the action of trypanocidal drugs on the trypanosomes.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0094, TRYPANOSOMIASIS - ENTOMOLOGICAL STUDY OF THE VECTORS
S.M. TOURE, (SG.131.0021)

Obectives: Knowledge of the Diptera that are vectors of trypanosomes, through their systematic classification, their ecology and their biology, is the basis for projects for the control of these vectors in regions where animal trypanosomiasis is endemic. The research covers the systematic classification of tsetse flies, their geographical distribution and ecology, and also that of the Diptera other than Glossina spp. capable of transmitting trypanosomiases: Stomoxyinae, Tabanidae and Hippoboscidae.

Results: Glossina species occupy the southern half of Senegal, except for a few residual islets extending as far (north) as the 15th Parallel. In the south, three species are found: Glossina palpalis gambiensis, G. morsitans submorsitans and G. longipalpis. The residual islets are colonies of Glossina palpalis gambiensis.

The vectors of trypanosomiasis other than Glossina are represented by some Tabanidae (the most frequent being Tabanus taeniola), by some Stomoxyinae, (Stomoxys calcitrans and S. nigra), finally some Hippoboscidae (Hippobosca equina, H. variegata). Numerous other, secondary species exist, however.

SENEGAL

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0095, RINDERPEST PROPHYLAXIS - SEROLOGICAL SURVEILLANCE OF IMMUNITY
P. BOURDIN, (SG.131.0022)

OBJECTIVE: Annual inspection of the immunity of cattle in regions where large-scale movements of cattle take place.

TECHNICAL APPROACH: Search for antibodies neutralizing the virus of rinderpest in serum samples from cattle, by the technique of kinetic seroneutralization on bovine foetal hepatocytes.

RESULTS OBTAINED: These inspection tests have been made annually since 1969.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0096, RINDERPEST PROPHYLAXIS - ESTABLISHMENT OF A THERMO-RESISTANT VACCINE
P. BOURDIN, (SG.131.0023)

OBJECTIVE: Pursuit of studies on the stabilization of the thermo- resistant strain in liquid medium. Testing for immunogenic capacity. Action of the chemical bodies.

TECHNICAL APPROACH: Selection of the virus by the limiting dilutions technique after autoclaving at 45 degrees C and titration.

RESULTS OBTAINED: One strain withstands 22 hours at 45 degrees C in liquid medium.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0097, PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY
P. BOURDIN, (SG.131.0024)

OBJECTIVE: Previous research studies on rinderpest in small ruminants have shown that very frequently there was a pulmonary infection; it is desirable to verify if the only causal virus is the virus of rinderpest.

TECHNICAL APPROACH: Attempt to isolate and to identify virus from samples taken at the level of the respiratory system.

RESULTS OBTAINED: Up until now, the only virus isolated is the virus of rinderpest of small ruminants. Several times, mycoplasms have also been isolated by the Bacteriology Service.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0098, POX OF SMALL RUMINANTS - EPIDEMIOLOGICAL AND PROPHYLACTIC RESEARCH
P. BOURDIN, (SG.131.0025)

OBJECTIVE: Sheep scab or sheep pox has been spreading in Senegal since 1970. It appears to be necessary to provide for the preparation of a vaccine.

TECHNICAL APPROACH: Isolation and identification of new strains. Pursuit of the attenuation by passages on cell cultures of the first strain isolated in 1971.

RESULTS OBTAINED: A first experiment on vaccination with the attenuated strain has been carried out in October 1972.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0099, AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK
P. BOURDIN, (SG.131.0026)

OBJECTIVE: Orientation of epidemiological research in two directions: To increase our knowledge concerning the vectors (culicoides and mosquitoes) and to throw light on the reservoir of the virus, still unknown up to now.

TECHNICAL APPROACH: Senegal is situated in the region where African horse sickness is endemic. Serological surveys on horses should enable localization of the zones where the disease exists in the rural form or a zone of severe endemicity. These surveys on horses are to be completed by surveys on other species and by inoculations based on samples obtained from wild animals and from blood-sucking arthropods.

RESULTS OBTAINED: The zones of severe endemicity are in the neighbourhood of the watering places in the sylvan and pastoral zone.

OBSERVATION: This project is to be sponsored by outside aid, which has been requested. At the national level only some preliminary surveys have been provided for.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0100, EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY
P. BOURDIN, (SG.131.0027)

OBJECTIVE: Aetio-epidemiological study of an equine encephalomyelitis observed during the spring of 1971.

TECHNICAL APPROACH: Field survey, capture of potential vectors, serological survey in horses and man, attempts to isolate the virus.

RESULTS OBTAINED: A survey made in 1971-1972 on horses living in the neighbourhood of the foci, has revealed in the survivors and in a certain percentage of healthy animals, the presence of antibodies fixing the neutralizing complement and inhibiting haemagglutination, indicating a contact with an arbovirus of Group A, the Semliki Forest (Valley) virus. No trace of antibodies indicating a contact with the other viruses of the equine encephalitides (equine encephalitis group).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0101, HEARTWATER PROPHYLAXIS - ESTABLISHMENT OF A METHOD FOR PREMUNITION OF CATTLE
M. RIOCHE, (SG.131.0028)

OBJECTIVE: Establishment of a method of prophylaxis applicable in dairy herds. To complete this by research for a technique for the detection of animals with inapparent infection.

TECHNICAL APPROACH: Premunition of cattle associated with an antibiotherapy. Detection of animals with inapparent infection by an immunological technique on which research is to be done.

RESULTS OBTAINED: A first experiment for detection of infected animals by the immunofluorescence technique has been a failure.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0102, THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES
M. RIOCHE, (SG.131.0029)

OBJECTIVE: Explanations are not always available on demand. It is essential for the requirements of prophylactic and of diagnostic work to have well-established lines at one's disposal.

TECHNICAL APPROACH: Establishment of susceptible lines of cells and study of their characteristics. Study of the susceptibility of these lines to various viruses.

RESULTS OBTAINED: 1) The obtaining of a line of bovine foetal hepatocytes; the study of its susceptibility is in progress. 2) Establishment of a line of ovine foetal kidney cells in progress.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0103, BOVINE PLEUROPNEUMONIA - ESTABLISHMENT OF A FREEZE-DRIED, HEAT-RESISTANT VACCINE

M.P. DOUTRE, (SG.131.0030)

DESCRIPTION, OBJECTIVE: The freeze-dried vaccines that have been established in the course of the preceding years have been prepared with strain T1 and these give complete satisfaction as to the quality of the immunity conferred (single vaccine, and mixed vaccine against pleuropneumonia and rinderpest). But these vaccines remain relatively sensitive to heat and they have to be used very quickly the moment they are opened for use. It would be desirable to be able to have available a freeze-dried pleuropneumonia vaccine capable of resisting heat in the conditions that usually prevail in the bush.

APPROACH: On account of the properties of thiosulphate in the protection of certain viruses, it seemed to be of interest to ascertain if this substance is effective in the same respect with Mycoplasma organisms. Other chemical substances may play the same role.

RESULTS: The studies completed in 1971 make it possible to state that the addition of thiosulphate in M/50 solution to the vaccine before freeze-drying has no harmful effect in the vaccine on the vitality of the micro-organisms but that the thermo-protective action is very weak. The experiments are to be repeated.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0104, LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY

M.P. DOUTRE, (SG.131.0031)

OBJECTIVE: Leptospirosis is an infection common to man and to domestic animals about which little is known in black Africa. Not many serological surveys have been carried out up to the present time, and there has been infrequent isolation of strains. Serological survey in wild rodents living in contact with man and with domestic animals by the demonstration of the criteria indicating the existence of Leptospires.

APPROACH: In the first instance, the study is being directed to the Farm of Sangalkam (Annex of the Laboratory) infested with rodents belonging to various species. In the course of a second phase, the survey will be extended to the rice-growing zones of Senegal. The following techniques: microbiological (attempts to isolate the organism), serological (agglutination - lysis) and histological (staining of kidney sections from rodents with Fontana stain) will be carried out in the course of this work accomplished in collaboration with the Pasteur Institutes of Dakar and Paris.

RESULTS: 170 rodents from the Sangalkam Farm have been caught. No strain of Leptospira has been isolated and no leptospire demonstrable by staining. On the other hand, if the serology has remained negative in the rodents (16 leptospiral antigens employed), it has given positive results with the serum of horses living in contact with Rattus rattus (agglutination - lysis positive, from dilutions of 1/300 to 1/500 with L. canicola). This result indicated with certainty the existence of the infection.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0105, SALMONELLOSIS - EPIDEMIOLOGICAL SURVEY ON HEALTHY CARRIERS

M.P. DOUTRE, (SG.131.0032)

OBJECTIVE: The salmonellosis constitutes one of the most frequent zoonoses in Africa. Moreover, research on healthy carriers disseminating the organism will present a certain interest. Work involves isolation and serotyping of strains from species of domestic and wild animals which live in the neighbourhood of man.

APPROACH: Work carried out in cooperation with the Pasteur Institutes of Dakar and of Paris.

RESULTS: The following have been studied for healthy carriers: pigs; birds of prey and blood-lapping chiroptera preying on man; rodents; frugivorous and insectivorous chiroptera, and their droppings. More than 150 strains have been isolated, and either serotyped or are in the process of being serotyped (publications to appear).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0106, BOVINE PLEUROPNEUMONIA - PATHOGENESIS

M.P. DOUTRE, (SG.131.0033)

OBJECTIVE: The pathogenesis of pleuropneumonia is still not well known and deserves deeper study.

APPROACH: Recent experiments lead one to think that phenomena of an immunological order may intervene in the genesis of the lesions.

RESULTS: Data obtained: Mycoplasma mycoides is not pathogenic for laboratory animals. The evidence of a specific toxin is not conclusive. The experimental infection of cattle is, from now on, easily produced. A research protocol ought to be set up in common with the central office of the I.E.M.V.T.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0107, RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS

M.P. DOUTRE, (SG.131.0034)

OBJECTIVE: Sheep and goats present infections of the respiratory system and of the digestive system in which bacterial agents intervene, usually playing a secondary role. Viruses (respiratory system) or parasites (digestive system) constitute the primary causal agents of the infections. Better knowledge of the role played by the bacterial factors in these diseases is needed.

APPROACH: This subject is being studied in common with the Virology and Parasitology Services as a function of the disease outbreaks reported. The disease often presents a seasonal character which influences the pursuit of the research (pneumopathy of goats in winter).

RESULTS: Numerous strains of pathogens have already been isolated and their characters studied (coli bacillus, Escherichia coli, Pasteurella, Mycoplasma organisms).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0108, VIBRIOSIS - EPIDEMIOLOGICAL SURVEY

M.P. DOUTRE, (SG.131.0035)

OBJECTIVE: In herds in Senegal an insufficiency of the level of fertility is prevalent, and this is still, in part, unexplained. It is certain that the qualitative and quantitative nutritional insufficiency is responsible, more often than not, for cases of infertility. Brucellosis has been found in the endemic state in certain regions of Senegal. Another possible cause, never investigated until the present time, is Vibriosis which would very well explain certain

outbreaks of enzootic sterility. It is planned to study the possible existence of Vibrio fetus in cattle herds in Senegal.

APPROACH: Sampling of vaginal mucus in herds selected as representative examples throughout the territory, and demonstration either of specific antibodies (muco-agglutination), or of the organism itself.

RESULTS: Survey not commenced.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0109, INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM

M.P. DOUTRE, (SG.131.0036)

OBJECTIVE: Botulism plays an important role in the aetiology of the disease-complex improperly called "forage disease", an infection prevalent in particular in the extensive rearing zone of Ferlo. Botulism from water of from forage linked with contamination of the drinking water, or of the forage by the cadaver of a small mammal, is also encountered in Senegal.

APPROACH: Diagnostic study of the infection and of the type of Clostridium botulinum causing it. Isolation of strains in the course of the appearance of fresh outbreaks. Study of the characters of the strains isolated.

RESULTS: Isolation of strains of Cl. botulinum types C and D; Study of the toxins produced; Study of the characters of the strains; culture of type C in dialysis sacs; Production of a toxoid for type C using aluminium phosphate as adjuvant. The study includes application of the immunofluorescence technique where a diagnosis of botulism is to be suspected.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0110, BRUCELLOSIS - EPIDEMIOLOGICAL SURVEY

M.P. DOUTRE, (SG.131.0037)

DESCRIPTION: Brucellosis is a zoonosis which manifests itself essentially in cattle by later and later abortions and often by inflammations of the bursae and serous membranes (hygromas-bursitis). In man manifestations are varied (fevers, adenites, orchitis, osseous or articular lesions).

OBJECTIVE: Epidemiological survey destined to demonstrate the importance of brucellosis in Senegal in cattle and small ruminants.

APPROACH: Work with the classical serological techniques (Ring test, seroagglutination test of Wright, complement fixation) and microbiological techniques (isolation of strains of Brucella) and study of their biochemical characters.

RESULTS: A sufficiently complete study has already been made on cattle; it has enabled the demonstration of the regions free from brucellosis (Ferlo) and of others having a high level of positivity (Casamance). Some strains of Brucella have been isolated from hygroma fluid, and their characters studied. The survey concerning the spread of brucellosis in small ruminants has only just commenced.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0111, BACTERIAL VACCINES - ESTABLISHMENT - IMPROVEMENT

M.P. DOUTRE, (SG.131.0038)

Description: Medical prophylaxis of bacterial diseases has constituted, and still constitutes in our times, one of the essential objectives pursued by the African veterinary services.

Objectives: As the health of animals conditions all the activities for further development, medical prophylaxis must be maintained without neglect.

Approach, Results: From the time of its foundation, the laboratory has established numerous vaccines (bacteria and mycoplasms) employed in the prophylaxis of the most constantly occurring bacterial infections: anthrax - bacterial and symptomatic types, haemorrhagic septicaemia, bovine pleuropneumonia. Numerous improvements have been introduced in the preparation of these vaccines in the course of the last few years (mass culture, aerated culture by shaking, improvements of the diluents for freeze-drying).

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0112, PASTEURELLOSIS - EPIDEMIOLOGICAL SURVEY

M.P. DOUTRE, (SG.131.0039)

Objective: Infections caused by Pasteurella multocida take on considerable importance in animal species, in particular in Africa where bovine haemorrhagic septicaemia constitutes a frequent seasonal infection (rainy season). Considered as zoonoses, the pasteurella infections are also of definite interest (septicaemias, adenites in man: for example in Senegal).

Study and typing of strains of Past. multocida isolated from the buccal cavity of domestic carnivores, either strays or family pets.

Approach: Analogous studies have been completed or are being carried out in industrially developed countries (France and the U.S.A.). Interest of comparison of the results obtained with those of tropical Africa.

Results: Isolation already of some twenty strains, rough on isolation of type A.

Study of their biochemical characters.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0113, STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT

M.P. DOUTRE, (SG.131.0040)

Description: Streptothricosis is a seasonal infection (rainy season) due due to the fungus Dermatophilus congolensis; it is characterized by the appearance of cutaneous lesions which reduce the value of the animal's skin and are capable of causing death, in extreme cases. In West Africa the cattle are particularly susceptible; but numerous other species of animals may be affected by the condition.

Objective: Study of the activity of certain substances in the treatment of the disease.

Approach: Work to be carried out in the field in liaison with officers of the Breeding/Rearing Service. Trials of cyclophosphamide used on sheep in Australia and of chlorhexidine digluconate at 0.1 percent.

Results: The use of the combination penicillin-streptomycin for injection at high dosage (Combiotic Pfizer-Clin) has already yielded spectacular results. The lessening of the rains in Senegal greatly reduces the number of outbreaks of streptothricosis. The attempts at vaccination against this disease have all failed.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0114, AVIAN DISEASES - EPIDEMIOLOGY - PROPHYLAXIS AND TREATMENT
F. SAGNA, (SG.131.0041)

Objective: Epidemiological surveys of the principal diseases. Construction of epidemiological maps concerning these diseases. Eventual eradication of these diseases (plans for prophylaxis).

Approach: Conduct tours of the regions, in order to perform collection of samples or treatment for experiments within poultry rearing establishments; treatment in the laboratory of these samples for establishment of a diagnosis and for the isolation or collection of the disease agents; long-term construction of epidemiological maps for each administrative region and in the whole of the country, as a function of the diseases encountered or of the pathogenic agents identified or isolated; establishment of plans for prophylaxis at the regional or national level as the case may be.

Results: Long term work. Results will be a function of number of samples and of means employed.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0115, AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT
F. SAGNA, (SG.131.0042)

Objective: Trivalent vaccine (against Newcastle disease, fowl pox and fowl typhoid/pullorum disease); the duration of the protection which it confers on vaccinated birds will have to be considerably increased (from 6 months to 1 year minimum).

Approach: 1) Above all, work would have to be done on the Newcastle disease component which constitutes the limiting factor of the group (immunity against Newcastle disease of about 6 months) in exalting the virulence of the vaccinal virus strain (Bankowski strain): either by serial passages in chick embryos (embryonated eggs); or by passages in progressively older chicks. 2) From the new exalted strain, to prepare a live monovalent vaccine against Newcastle disease which will be incorporated in the fowl pox and fowl typhoid/pullorum disease vaccine. 3) Trials of this new "TRIAVIA" (code name) vaccine over 12 to 15 consecutive months.

Results: Will not be known before 1974, at earliest.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0116, AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - VACCINE 9 R AGAINST FOWL TYPHOID AND PULLORUM DISEASE
F. SAGNA, (SG.131.0043)

Objective: To prepare and use experimentally a new vaccine (against fowl typhoid and pullorum disease), which does not elicit the appearance of agglutinating antibodies in the blood or the serum of the vaccinated birds, to enable the definite identification of subjects affected with fowl typhoid and with pullorum disease by their reactions to rapid haemagglutination or serum agglutination tests on slides with the aid of the pullorum antigen, and without the possibility of their being confused with subjects that have been vaccinated.

Approach: New strain of Salmonella gallinarum pullorum (9 R from Weybridge, whence the code name of this vaccine). Preparation of the new vaccine. Experimental work with this new vaccine: (1) Testing for sterility; (2) Innocuity tests; (3) Tests for efficacy (duration of the immunity conferred); (4) Verification of the absence of agglutinating antibodies in all the vaccinated birds.

Results: Experimental vaccine prepared and stocks built up. Experimental use on birds started in December 1972.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

11.0117, AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE
F. SAGNA, (SG.131.0044)

Objective: Simplification of vaccination campaigns (a single intervention instead of four in succession). Reduction of the cost of vaccination campaigns.

Approach: Preparation of the followng monovalent components: 1) Vaccine against Newcastle disease (fowl pest) plus Virology; 2) Vaccine against fowl pox plus Virology; 3) Vaccine against fowl cholera plus Bacteriology; 4) Vaccine against fowl typhoid/pullorum disease plus Bacteriology; adequate mixing of these monovalent vaccines to obtain of the final vaccine which will be freeze-dried (live vaccine); experimental work with the new vaccine (sterility tests - innocuity tests - tests for efficacy).

Results: Will be known at the end of this experimental work, that is, in 1974.

Durability: Minimum 12 months, counting from the date of preparation of the vaccine.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

SOUS-STATION FORESTIERE CTFT DE BAMBEY

B.P. 2312, Dakar

11.0118, STUDY OF THE POSSIBILITIES OF REPLANTING WOODLAND IN THE WESTERN CENTRE OF SENEGAL UTILIZING EXOTIC SPECIES OF RAPID GROWTH
P.L. GIFFARD, (SG.112.0001)

Objective: To place at the disposal of the Forestry Service some planting material adapted to the climate and to the different types of soil, to define techniques for preparaton of the ground and for plantation without watering for the realization of periurban woodlands destined to produce fuel and for the creation of windbreak to protect crops.

Approach: Experiments on the introduction and the choice of species of rapid growth: Eucalyptus (30 species - 57 origins), Dalbergia sissoo, Prosopis juliflora. . .experiments on mechanical preparation of the soil and on fertilization.

Results: The Eucalyptus species camaldulensis and microtheca seem to be the best adapted to the Station. Some comparative arrangements of sources of origin have begun to be planted up. The working of the soil in depth (sub-soil working or "large planting-pits" method) is $ssential, as is also the total elimination of weeds during the rainy season.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0119, STUDY OF THE POSSIBILITIES OF REPLANTING OF WOODLAND IN THE WESTERN CENTRE OF SENEGAL UTILIZING LOCAL FOREST SPECIES
P.L. GIFFARD, (SG.112.0002)

Objective: Study of the silviculture of the principal forest species of the Soudanian zone, in the interests of the economy of

Senegal (for timber, roundwood, firewood, wood for handicrafts, gum, reestablishment of soils.

Approach: Definition of techniques for nursery work, for preparation of the ground and for plantation. Experiment on introduction of, and study of growth on: Acacia albida, A.senegal, A. scorpioides var. astringens, Bombax costatum, Celtis integrifolia, Cordyla pinnata, Dalbergia melanoxylon, Poupartia birrea, Prosopis africana, Sterculia setigera, Tamarindus indica.

Results: The silviculture of Acacia albida, its growth, its role in the regeneration of soil are now known and the results of the research work can be popularized.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

SOUS-STATION FORESTIERE CTFT DE DJIBELOR

B.P. 2312, Dakar

11.0120, STUDY OF THE GROWTH OF TEAK

P.L. GIFFARD, (SG.113.0001)

Objective: To know the growth of Tectona grandis in Casamance to determine the rhythm of clearings to be applied in plantations completed by the Forestry Service and to establish production tables.

Approach: Setting up a CCT/Plot arrangement in a 1962 population - annual measurements. Weekly collection of tree-measuring tapes placed on 12 teak trees.

Results: The calendar for the first two clearings is established.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0121, EXPERIMENT ON THE INTRODUCTION OF TROPICAL RESINOUS SPECIES

P.L. GIFFARD, (SG.113.0002)

Objective: Study of the possibility of utilization of tropical resinous trees for the replantation of woodland in lower Casamance.

Approach: Experiments on mycorrhization, creation of a small population destined to provide mycorrhisized land. Definition of techniques for nursery and for plantation. Attempts to introduce: Pinus carbaea caribaea, P. hondurensis, P. taeda, P. elliotii, P. merkusii, Callitris intratropica.

Results: It seems that the introductions must be oriented towards the sources of Pinus caribaea.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

STATION DE RECHERCHES RIZICOLES DE DJIBELOR IRAT

B.P., Ziguinchor

11.0122, STUDY OF SEED-DISTRIBUTORS FOR RICE

S.L. TRAVERSE, (SG.156.0001)

Objective: Direct sowing is of great importance - which is the simplest seed-distributor and the best adapted for the local conditions?

Approach: Trials with the existing material on the market.

Results: The seed-distributor type for this region must be a machine with adjustable channelling and having large wheels. It must enable sowing of pregerminated seed, and be very simple. A prototype might be constructed.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0123, COMPARISON OF METHODS OF APPLICATION OF FERTILIZERS ON RICE

S.L. TRAVERSE, (SG.156.0002)

Objective: In the conditions of lower Casamance, should the fertilizers be buried or put on as a dressing?

Approach: Perennial experiment, 4 treatments, 4 repetitions.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0124, INTRODUCTION OF NEW VARIETIES OF RICE FOR THE FRESH-WATER RICE FIELDS OF CASAMANCE

C. MAGNE, (SG.156.0003)

Objective: Varieties of high productivity, resistant to diseases and to the acidity of the soil, fairly early (110 - 130 days), cultivable in the dry or humid season, with quality conforming to the taste of the consumer in Senegal.

Approach: Introduction of foreign varieties, collections tested, tests for piriculariosis, culinary tests, comparative experiments for yield.

Results: Varieties IR8, Taichung N1, I Kong Pao are suitable for non-acid rice-fields without too much water.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0125, INTRODUCTION OF NEW VARIETIES OF PLUVIAL RICE

C. MAGNE, (SG.156.0004)

Objective: Varieties of high productivity, resistant to piriculariosis and to drought, precocity 90 to 110 days, with quality conforming to the taste of the consumer in Senegal.

Approach: Introduction of foreign varieties, collections tested, tests for piriculariosis, culinary tests, comparative experiments for yield.

Results: Varieties I Kong Pao and TS 123 able to be popularized in 1969; Che Ke Ciao being popularized at present.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0126, VARIETAL IMPROVEMENT OF RICE BY HYBRIDATION FOR THE IMPROVED FRESH-WATER RICE FIELDS OF CASAMANCE

C. MAGNE, (SG.156.0005)

Objective: Varieties of high productivity, resistant to diseases and to the acidity of the soil, fairly early (110 - 130 days), cultivable in the dry or humid season, with quality conforming to the taste of the consumer in Senegal.

Approach: Hybridization of varieties of high productivity, with local varieties resistant to piriculariosis and to acidity; F2 to F4: direct bulk; F5 to F7: pedigree selection; Culinary tests; Comparative experiments for yield.

Results: Lines resistant to piriculariosis and adapted to acid rice-fields - ready for propagation in one or two years.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0127, VARIETAL IMPROVEMENT OF RICE BY HYBRIDIZATION FOR THE SALT-WATER RICE-FIELDS OF

LOWER CASAMANCE
C. MAGNE, (SG.156.0006)

Objective: Research for varieties of high productivity, very early (100 days), cultivable in the humid season, tolerant to salt, and having a quality conforming to the taste of consumers in Senegal.

Approach: Hybridization of early and productive varieties with local varieties tolerant to salt: F2 to F4 directed bulk; F5 to F7 pedigree selection; Culinary tests; Comparative experiments for yield.

Results: In 1972 some thirty lines are in process of selection.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0128, VARIETAL IMPROVEMENT OF PLUVIAL RICE BY HYBRIDATION
C. MAGNE, (SG.156.0007)

Objective: Varieties of high productivity, resistant to piriculariosis and to drought, precocity (90 - 110 days), and quality conforming to the test of the consumer in Senegal.

Approach: Hybridation of early and productive varieties with varieties resistant to piriculariosis and to drought: F2 to F4: directed bulk; F5 to F7: pedigree selection; Culinary tests; Comparative experiments for yield.

Results: In 1972 some lines seem to answer the objectives. Their value remains to be confirmed by multilocal experiments.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0129, STUDY OF THE DYNAMICS OF THE SOILS OF RICE-FIELDS IN LOWER CASAMANCE
B. GORA, (SG.156.0008)

Objective: To study the dynamics of the physico-chemical and chemical properties of the 4 principal rice-field soils of Casamance in the condition of submersion, and their effect on the yield of rice.

Approach: Experiment in a hot-house, in pots.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0130, ACTION OF BURIED STRAW ON THE DYNAMICS OF SOILS
B. GORA, (SG.156.0009)

Objective: To study the dynamics of the elements and the physio- chemical and chemical properties of 2 types of soils on the station (clayey and loamy-sandy) in the presence of buried straw and in the condition of submersion, with the object of understanding the effect of the straw on these properties and on the development and the yields of rice.

Approach: Two-square factorial experiment, implanted in a hot- house in plastic pots.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0131, ACTION OF LIME AND OF MANGANESE DIOXIDE ON THE DYNAMICS OF AN ACID CLAYEY SOIL
B. GORA, (SG.156.0010)

Objective: To study the action of lime and of manganese dioxide on the dynamics of the physico-chemical and chemical properties of a clayey and acid soil from the Mandouar valley, with the object of understanding the beneficial effect of lime and of manganese dioxide on the development of rice and on the yields, on this soil where toxicity in iron appears.

Approach: Two-square factorial experiment, in plastic pots, implanted in a hot-house.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0132, IMPROVEMENT OF AN ACID SULPHATIC SOIL FOR THE CULTIVATION OF RICE
B. GORA, (SG.156.0011)

Objective: To study the effect of 3 improving treatments on the physico-chemical and chemical properties of an acid sulphatic soil in the condition of submersion and also on the development of rice.

Approach: 2 x 2 x 2 x 2 factorial experiment in pots, implanted in a hot house.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0133, FERTILIZATION OF RICE FIELDS
B. GORA, (SG.156.0012)

Objective: To establish a fertilization adapted to the types of rice-field soils in Casamance.

Approach: Response curves to N, P, K, in Fisher blocks.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0134, BURIAL OF STRAW IN A RICE FIELD
B. GORA, (SG.156.0013)

Objective: To compare the effect of the burial of straw to that of potassium or nitrogen on the development of rice and on the yields.

Approach: Two-square factorial experiments for the straw x potassium and 3 x 2 for the nitrogen.

Results: The action of the straw is always highly significant and superior or equal to that of the potassium or the nitrogen. There is a specific action of the straw.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0135, CHEMICAL CONTROL OF INSECTS DESTRUCTIVE TO IRRIGATED RICE
P. ROUDEILLAC, (SG.156.0014)

Objective: Establishment of chemical control of harmful insects, that is effective, practical and economical in irrigated rice-fields.

Approach: 1) 12 experiments in rice-fields, with different insecticides; 2) Study of the mode of application of the insecticide; 3) Combination of application of nitrogenous fertilizer plus insecticide and economic profitability.

Results: 1) Establishment of a method of treatment that can be popularized; 2) Study of the economic profitability in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0136, STUDY OF THE POSSIBILITIES OF BIOLOGICAL CONTROL OF RICE PESTS
P. ROUDEILLAC, (SG.156.0015)

Objective: Utilization of insects and micro-organisms for control of the populations of insects harmful to rice.

Approach: 1) Inventory of the useful entomofauna in Casamance, and study of their particular biological characters; 2) Study of their population dynamics; 3) Rearing of some of them in the laboratory; 4) Attempts to introduce foreign parasites; 5) Open-field experiment with a biological insecticide (Bacillus thuringiensis).

Results: 1) Successful rearing of an interesting parasite; Studies in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0137, STUDY OF THE VARIETAL RESISTANCE OF RICE TO HARMFUL INSECTS
P. ROUDEILLAC, (SG.156.0016)

Objective: To select varieties resistant to harmful insects (Work in connection with the Service for the Improvement of Rice).

Approach: Investigation on 400 varieties of rice in collection.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0138, STUDY OF THE INSECTS THAT ARE HARMFUL TO RICE IN CASAMANCE
P. ROUDEILLAC, (SG.156.0017)

Objectives: 1) Census of the species harmful to rice; 2) Precise details of their biological cycle; 3) Study of their population dynamics.

Approach: 1) Surveys in rice-fields; 2) Luminous traps; 3) Laboratory rearing experiments.

Results: 1) lst point of the objectives attained to a large extent; 2) Points 2 and 3 in the course of being studied.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

STATION FORESTIERE CTFT DE HANN

Parc de Hann, B.P. 2312, Dakar

11.0139, STUDY THE POSSIBILITIES OF AFFORESTATION ON THE SALT LANDS OF SINE-SALOUM
P.L. GIFFARD, (SG.111.0001)

Objective: To try to find one or more forest species capable of being utilized for reafforestation of the more or less saline soils, all unsuitable for agriculture.

Approach: Creation in the region of Sine-Saloum of three places for experiments on different types of soil; Determination of the content in chlorides of the soil by taking samples every 30 metres in the 0/5, 30/35 and 60/65 cm. horizons; Experiments on the introduction and choice by elimination of local species (Acacia albida, A. stenocarpa, A. scorpioides var. astringens, Bauhinia reticulata, Combretum glutinosum, Sesbania sp.) and essentially exotic species (Parkinsonia aculeata, Prosopis juliflora, Eucalyptus (8 species, 14 sources of origin), Casuarina equisetifolia, Melaleuca leucadendron, (4 sources of origin), Atriplex); Experiments involving working of the soil and fertilization.

Results: The results are very variable according to the chloride contents of the soil. For the moment it seems that the work will have to be oriented towards Melaleuca leucadendron.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0140, STUDY THE POSSIBILITIES OF REPLANTING WOODLAND IN THE DELTA OF THE SENEGAL RIVER
P.L. GIFFARD, (SG.111.0002)

Objective: To get a clear idea if it is possible on the technical level and economically advantageous to undertake forestry plantations destined to provide household fuel in a zone without forest where 40,000 persons have to be installed for the cultivation of rice.

Approach: Attempt to introduce at the experimental outstation of Ross-Bethio, species of rapid growth (Eucalyptus - Prosopis juliflora - Dalbergia sissoo, etc...) Definition of techniques for preparation of the soil, for plantation and for maintenance of the saplings in such a way as not to water them in the dry season. Experiment on fertilization.

Results: The techniques for preparation of the ground and for plantation are satisfactory. Among the 17 species and the 40 sources of origin of Eucalyptus tested, it seems that 4 sources of E. camaldulensis from the north- west of Australia are suitable on the tropical ferruginous soils. On the contrary, the results are negative on the halomorphic soils.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0141, SILVICULTURAL RESEARCH WORK IN AN ARID ZONE - SILVICULTURE OF THE LOCAL SPECIES
P.L. GIFFARD, (SG.111.0003)

Objective: To place at the disposal of the Forestry Service techniques for plantation which have been tested in a zone having a very long dry season, and planting material adapted to the climate and to the different types of soil, in order to undertake replantation of woodlands to stabilize the encroachment of desert, to improve the pastures and to increase the production of gum arabic.

Approach: Research work done at the experimental outstation of Linguere. Study of the silviculture of gum trees (Acacia senegalensis and Acacia laeta) and of Dalbergia melanoxylon.

Results: The techniques for preparation of the planting material and for plantation are established, but it seems essential to undertake genetic studies and experiments on sources of origin in order to select trees that are good producers of gum.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

11.0142, SILVICULTURAL RESEARCH WORK IN AN ARID ZONE - EXPERIMENT ON THE INTRODUCTION OF EXOTIC SPECIES
P.L. GIFFARD, (SG.111.0004)

Objective: To introduce planting material adapted to the very long dry season, in order to be able to envisage plantations at the approaches to villages and to well-borings to provide fuel, check erosion by wind, and improve the environment.

Approach: Experimental introduction at the experimental outstation of Linguere of exotic species, in particular of Eucalyptus from the dry zones of Australia (27 species - 56 sources of origin).

Results: The results are disappointing enough. It appears that the research work should be oriented towards Eucalyptus microtheca.

SUPPORTED BY Centre Tech. For. Trop. - Dakar, Senegal

STATION IFAC DE KEUR MAMA LAMINE

Inspection de l' Agriculture A Kaolack

11.0143, ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE
V. FURON, (SG.171.0001)

Objective: Definition of the species of fruit crops adapted to the climatic zone, of their performances, of the utilization of the products.

Approach: Specific experimental arrangements, situated in chosen climatic sites for the study of the adaptability of fruiting

species cultivated as homogeneous populations or as associations: banana tree, pineapples, mango tree (varietal study), avocado, citrus fruit trees, cashew tree, grenadilla (Passion fruit), guava.

Results obtained: Definition of the techniques for multiplication and for cultivation of the banana and pineapple in Casamance. Varietal reconversion of the mango tree by grafting. Definition of the ecological zone favourable for the avocado tree (Mexican hybrids). Base for the renovation of the citrus orchard in existence, thanks to the introduction and the multiplication at the Keur Mama Lemine Station of planting material, free from the principal known virus diseases and representing the best commercial varieties. Awaited: Definition of the suitability for fruit-growing in the different climatic zones of Senegal and of cropping techniques with a view to the creation of agro- industrial unit-types of production.

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Dakar, Senegal

STATION IFAC DE SINGHER

Inspection de l' Agriculture A Ziguinchor, B.P. 242, Ziguinchor

11.0144, ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE

V. FURON, (SG.172.0001)

Network project - see SG.171.0001. (11.0143)

SUPPORTED BY Inst. Fr. de Rech. Fruit. - Dakar, Senegal

STATION IRAT DE NIORO-DU-RIP

B.P., Nioro - du - Rip

11.0145, THE RESIDUAL EFFECTS OF HERBICIDES

H. THIROUIN, (SG.154.0001)

Objective: The use of chemical preparations as weed-killers always requires careful handling, and it is necessary to know if the herbicide being used has residual effects on the next crop on the one hand, and if on the other hand there is no cumulative effect of (herbicide) preparations in the course of a rotation that can make the soils unfit for cultivation for a certain period.

Approach: Field trials of herbicides.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0146, STUDY OF HERBICIDE PREPARATIONS ON SORGHUM

H. THIROUIN, (SG.154.0002)

Objective: With the diminishing height of sorghums which ought to come up to approximately 1.5 metres, densities are tending to increase and the difficulties of weeding are growing. Indeed, the greater the density, the more difficult it is to carry out weeding. Herbicides could provide a possible remedy for this.

Approach: Experiments with different herbicides.

Results: Propachlore seems to be of interest.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0147, STUDY OF HERBICIDE PREPARATIONS ON GROUNDNUTS ON SANDY SOILS

H. THIROUIN, (SG.154.0003)

Objective: The principal restrictive bottleneck for the farmer lies at the time for the first hoeing operations. He has not yet finished with his sowing and there is a very considerable growth of weeds. The herbicide at sowing could free the farmer and thus enable him to keep all his crops in perfect order.

Approach: Various preparations are being compared.

Results: The mixture ametryne-prometryne appears to be of interest.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0148, STUDY OF THE CHEMICAL WEEDING OF GROUNDNUTS

J.P. DUESE, (SG.154.0004)

Network project - see SG.151.0009. (11.0019)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

STATION IRAT DE RICHARD TOLL

B.P., Richard Toll

11.0149, STUDY THE DIFFERENT SYSTEMS FOR CULTIVATION OF RICE

J.P. AUBIN, (SG.153.0001)

Objective: To determine the best systems for rice cultivation that can be utilized by the rice growers of the Senegal River delta.

Approach: A) Comparison of 3 techniques for rice cultivation: 1) sowing in the dry period and coming up during rain; 2) sowing as pregerminated seed; 3) pricking-out. B) In 3 different types of management: 1) secondary; 2) improved secondary; 3) tertiary. C) Using 2 varieties of rice: 1) D 52-37 variety much used in the delta; 2) IR8 variety with a strong production potential.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0150, CONTROL CAMPAIGN AGAINST RHIZOME RICE

J.P. DEUSE, (SG.153.0002)

Objectives: To destroy rhizome rice and prevent the re-infestation of rice-fields.

Approach: Experiments with herbicides; working the soil.

Results: 1) Solutions that are potentially suitable but which present some disadvantages. 2) Pursuit of experiments with herbicides.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0151, TRIALS OF MOTOR-TILLERS IN THE CONDITIONS OF INUNDATED RICE CULTIVATION

A. WANDERS, (SG.153.0003)

Objective: The object of this trial is to acquire knowledge of the mechanical behaviour and possibilities of the materials and of the time needed for the preparation of a correct seed-bed for rice.

Approach: Experimental method in rice cultivation.

Results: In progress for the Staub PP 4 B motor-tiller (Hertz motor). Trials completed for the Kubota K700.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

SENEGAL

STATION IRAT DE SEFA

B.P., Sefa

11.0152, EPIDEMIOLOGY OF PIRICULARIA CRYZAE - METHODS OF CONTROL

J.C. GIRARD, (SG.152.0001)

Objective: To obtain improved varieties, presenting a good resistance in the field to piriculariosis.

Approach: The studies deal with the behaviour of varieties as a function of environmental conditions (notably soil).

Results: The first indications concerning varietal behaviour and the action of different chemical elements, applied to the soil, should be available at the end of the 1973 campaign (October).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0153, STUDY CHEMICAL WEEDING OF RICE GROWN IN THE RAINY SEASON

J.P. DEUSE, (SG.152.0002)

Objectives: Research for herbicides suited to the ecology of Upper Casamance.

Approach: Trials of herbicides selected in advance by the I.R.A.T./Ivory Coast; normalized methodology.

Results: Herbicides effective against Gramineae, insufficient against dicotyledons. Pursuit of herbicide experiments.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0154, EVOLUTION OF SOILS IN THE COURSE OF CULTIVATION

S. DIATTA, (SG.152.0003)

Objective: System of intensive cultivation without degradation of the potentialities of the soil.

Approach: Setting up of two experiments: a. Regeneration of a degraded soil cultivated for 90 years; b. Maintenance of the fertility of a piece of land recently cleared. In the two cases, utilization of modern techniques of cultivation with application of fertilizer, or of the traditional system of cultivation on ridges without application of fertilizer.

Results: Interpretation in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0155, CREATION OF EATING VARIETIES OF GROUNDNUTS FOR CASAMANCE

J.C. MAUBOUSSIN, (SG.152.0004)

Network project - see SG.151.0045. (11.0055)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

11.0156, STUDY OF THE HARMFULNESS OF WEEDS TO RICE

J.P. DEUSE, (SG.152.0005)

Objectives: To determine the influence of weeds on the productivity of rice in the beginning of the cycle; to measure the loss of yield in that case, according to the date of the first weeding.

Approach: Total evaluation in the course of this first phase of the study. Sum of the influences of all kinds (water - light - mineral elements. . .) due to the conjoint action of all the species of weeds.

In the course of a second phase the total phenomenon will be analyzed as a function of each of the principal weed species.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Senegal

STATION IRCT DE KAOLACK

B.P. 208, Kaolack

11.0157, VARIETAL EXPERIMENTATION, COTTON

F. BLANGUERNON, (SG.181.0001)

Objective: Varietal test intended for choice of the variety best adapted for large-scale cultivation.

Approach: 12 experiments with 4 varieties; 3 microexperiments with 7 varieties; Fisher blocks - 3 rows/plot - 6 to 8 repetitions - standard mineral fertilization and insecticidal protection.

Results: Propagation of variety BJA 592.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0158, COLLECTION, QUARANTINE, AND VARIETAL EXPERIMENTATION ON COTTON

F. BLANGUERNON, (SG.181.0002)

Objective: Quarantine for the introduction of new varieties coming from foreign countries.

Approach: Isolated plot capable of receiving occasional irrigations.

Results: Propagation, in the subsequent varietal experiments, of varieties recognized as being free from cryptogamic or viral diseases. This quarantine should enable the reception and the study of varieties imported for West Africa.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0159, MULTIPLICATION OF A GLANDLESS VARIETY OF COTTON PLANT

F. BLANGUERNON, (SG.181.0004)

Objective: To study the behaviour and the production of a glandless variety of cotton plant, the seeds of which could provide a flour palliating the inadequacies of protein in the human diet in Senegal.

Approach: Isolated plot in a rural environment.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0160, SELECTION FOR CONSERVATION OF THE POPULARIZED CULTIVAR OF THE COTTON PLANT

F. BLANGUERNON, (SG.181.0005)

Objective: To maintain at their high levels the characteristics of the cultivated variety of cotton plant - Production by the hectare; Picking yield of cotton-seed; Characteristics of the fibre.

Approach: Application each year on a small scale of the technique known as "mass pedigree selection" to cotton plants in cultivation. Comparison in comparative varietal experiments of the bulk so created with the variety when it was quite new. Multiplication of the bulk which will then pass into the national multiplication system.

Result: All the characteristics of the cultivar BJA 592 (Gossypium nirsutum) are integrally conserved and the fibre, thanks to its qualities and their stability, is always sold at the best price on the world market.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0161, STUDY ON THE NITROGENOUS NUTRITION OF THE COTTON PLANT IN THE FIELD

F. BLANGUERNON, (SG.181.0006)

Objective: To know, as a function of environmental factors, the period during which the cotton plant is benefited by an application of nitrogen.

Approach: A.) A comparative experiment doing the Fisher block method was set up using 8 component plots with 4 rows per plot each 25 meters long. Seven treatments were applied as follows: (1) Control without manure; (2) Basic SPK fertilizer; (3) Basic SPK fertilizer plus 11N applied 3 times - once weekly from day of sowing (0-20 days); (4) Basic SPK fertilizer plus 11N applied 5 times; once weekly from day of sowing (0-40 days) (5) Basic SPK fertilizer plus 11N applied 7 times - once weekly from day of sowing (0-60 days); (6) Basic SPK fertilizer plus 11N applied 9 times - once weekly from day of sowing (0-80 days); (7) Basic SPK fertilizer plus 11N applies 11 times - once weekly from day of sowing (0-120 days). (B.) Weekly examinations of the moisture profiles; (C) Regular foliar analyses (foliar diagnosis).

Result: In the conditions of the year (heavy rains from the 30th day, then drought from the 90th day onwards), applications of N beyond the 20th day have remained without effect on the yield by the hectare of the cotton plant.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0162, STUDY OF 2 NITROGENOUS FERTILIZERS OF SLOW MINERALIZATION, IN COTTON CULTIVATION

F. BLANGUERNON, (SG.181.0007)

Objective: As part of the nitrogen runs the risk of being leached out in August, the object is to seek nitrogenous fertilizers with slower mineralization and having a good effect on the production of the cotton plant.

Approach: Eight comparative plots, each of 4-25 meter rows were treated with the following materials: (1) Control without manure; (2) Popularized formula; (3) Floranid Nitrophoska, (4) Nitrophoska. (N applied in same quantity as in BASF formulas completed in P, K, and S in both 3 and 4, as proposed by Badische Anilin (BASF), N equals 20; of which 14.5% is isobutylidene diurea; 2.5% NO3; 3.0% NH4; P2O5 equals 5; K2O equals 8; Sequals 11-14% in Floranid Nitrophoska. Nitrophoska is 15-15-6, of which 45% is N in nitric form.

Results: Still unknown.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0163, EXPERIMENTAL ATTEMPTS TO CORRECT THE POTASSIUM DEFICIENCY IN COTTON PLANTATIONS IN SINE-SALOUM

F. BLANGUERNON, (SG.181.0008)

Objective: To determine the rate and the period for application of K in order to preclude manifestations of the potassium deficiency of the soils in the cotton and sorghum crops.

Approach: 1) Experiment according to the profile method to specify the N-K relationship in the presence of a severe potassium deficiency. "Profile" made in the surface for study of the N-K response: NO3- plus 3K ion 10,000 equivalents/ha. 2) Experimental curve of the activity of K; increasing doses of K are applied (50, 100 and 200 kg KCl/ha) and fractionated applications tested. Fisher block method, 6 repetitions, component plots of 4 rows of 25m, 8 test materials: 8 tests consisting of (a) Control without manure, (b) Basic fertilizer (FB) composed of 10N, 12S, 32P/ha. at sowing and 23 N/ha. at 50 days after sowing, (c) K1: FB plus 50 kg/ha KCl at sowing, (d) K1-2: FB plus 25 kg/ha KCl at sowing plus 25 kg/ha. KCl on the 50th day, (e) K2: FB plus 100 kg/ha. KCl at sowing, (f) K2-2: FB plus 50 kg/ha. KCl sowing plus 50 kg/ha KCl at 50 days after sowing, (g) K3: FB plus 200 kg/ha at sowing, (h) K3-2: FB plus 100 kg/ha KCl at sowing plus 100 kg/ha. KCl on the 50th day after sowing.

Result: The first result emphasizes the advantage of an application of potassium on the 50th day of vegetative growth. However all the elements used in the experiments are not yet analysed.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0164, STUDY FORMS OF PHOSPHATE FERTILIZERS

F. BLANGUERNON, (SG.181.0009)

Objective: Possible economic utilization of the natural phosphates of Taiba.

Approach: 1 experiment - 6 materials (comparison of natural phosphates with soluble phosphates), 4 rows, 25 metres/plot, 8 repetitions - Fisher blocks.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0165, WITHDRAWAL EXPERIMENTS FOR THE STUDY OF MINERAL DEFICIENCIES OF THE SOIL IN RELATION TO THE COTTON PLANT

F. BLANGUERNON, (SG.181.0010)

Objective: Precise cartography of the mineral deficiencies of the soils of the cotton plantation zone. Correlation with foliar diagnosis for study of the critical levels in the nutrition of the plant.

Approach: Annual experiments; tests - 4 to 8 per year; 6 test materials; 4 rows, 25 m/plot; 8 repetitions - Fisher blocks. Study of the yields and foliar diagnosis.

Results: Regional cartography of the deficiencies.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0166, PLURIANNUAL MINERAL FERTILIZATION EXPERIMENTS, SO-CALLED "WITHDRAWAL" EXPERIMENTS, IN A CROP ROTATION WITH COTTON

F. BLANGUERNON, (SG.181.0011)

Objective: To evaluate mineral deficiencies in time and for the various crops grown in the rotation. To estimate the requirements in mineral fertilizing elements for the whole of a rotation.

Approach: 3 so-called "withdrawal" experiments are in progress with the rotation: cotton - sorghum - arachis. Fisher block method, 8 repetitions, component plots of 4 rows of 25 m, 7 test materials: - material not manured; Copious manuring 54N, 16S, 90P, 96K; Manuring in popular use 33N, 8S, 30P, 54K; Material without N - 8S, 30P, 54K; Material without S - 33N, 30P, 54K; Material without P - 33N, 8S, 54K; Material without K - 33N, 8S, 30P; 1 experiment in Sine-Saloum, 1 experiment in Eastern Senegal, 1 experiment in Haute Casamance.

Results: After two years the deficiencies are being maintained. Sorghum appears to be less susceptible than the cotton-plant to the absence of K in the fertilizer.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0167, EXPERIMENTS COMPARING IN TIME THE EFFICIENCY OF DIFFERENT RECOMMENDED FORMULATIONS FOR MANURE APPLIED TO COTTON CROPS

F. BLANGUERNON, (SG.181.0012)

Objective: To obtain more precise indications for the establishment of a formula for the cheapest and most efficient fertilizer.

Approach: 10 experiments distributed in 3 regions of Senegal (Sine-Saloum, Eastern Senegal and Haute Casamance): Fisher block method, 8 repetitions, component plots of 4 rows of 25m, 5 materials: Control without manuring; Formula for fertilizer recommended this year; Formula - id - plus 22.5N on the 30th day; Formula popularized this year; Formula popularized this year plus

22.5N on the 50th day. The formulas vary with the years and with the regions within the following limits: Formulas for recommended fertilizers: 18 to 40N, 8S, 30 to 50P, 24 to 54K; Formulas for popularized fertilizers: 13 to 18N, 0 to 20S, 11 to 20P, 0 to 29K.

Result: On the average, the recommended formulas give higher yields than those of the popularized formulas. The popularized formulas are completed in N and K. The applications of N on the 30th day have a very positive effect (an additional 10 kg of cotton seed per application of 1 kg. N).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0168, MOISTURE STUDIES OF THE COTTON-GROWING SOILS OF SINE SALOUM

F. BLANGUERNON, (SG.181.0013)

Objective: Moisture studies on light soils- correlation with nitrate nutrition of the cotton crop. Attempt to explain the moisture reserves of these soils, movements of water in the soil, inseparable from the nitrate nutrition of plants in non-irrigated cultivations.

Approach: Weekly sampling for water. Analysis of moisture profiles.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0169, FOLIAR DIAGNOSIS ON THE COTTON PLANT

F. BLANGUERNON, (SG.181.0014)

Objective: Foliar diagnosis on different agronomic test materials. Attempt to approach and to establish curves of critical level for the nutrition of the cotton plant in mineral elements.

Approach: Sampling of leaves at fixed dates. Foliar analyses.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0170, EXPERIMENTAL USE OF CHEMICAL HERBICIDES IN A COTTON PLANTATION

F. BLANGUERNON, (SG.181.0015)

Objective: To preclude the development of weeds during the first 45 days which correspond to a period during which the grower is very busy with other crops. To choose a herbicide preparation that is teletoxic, persistent, simple to apply and of moderate price, and that is not phytotoxic for the cotton plant.

Approach: 3 comparative experiments. Fisher block method, 5 repetitions, component plots of 10 rows of 50 m; 4 test materials: Control "for safety" as with the peasantry -Herbicide composed of prometryne and of ametryne (19 percent and 48 percent) 1.5kg/ha. of cotton plantation- Herbicide with 80 percent of diuron; 1 kg/ha. of cotton plantation - Herbicide based on trifluraline; 1.5 litre/ha. of cotton plantation. Application - as a spray over the entire surface (solution in 180 litres of water/ha.) - or as a "sanding", for the prometryne plus ametryne mixture (mixture with 200 kg sand/ha.). Application - after sowing and before the seedlings are up - previous to sowing for trifluraline.

Result: Phytotoxicity of the prometryne plus ametryne mixture in the conditions of use. Diuron gives satisfactory results, it is easy to apply, persistent and cheap. Trifluraline must be lightly covered with soil before sowing. Some very positive demonstrations have been made to the peasantry who are asking to have the technique popularized.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0171, EXPERIMENTS TO CONFIRM THE INSECTICIDAL VALUE OF A PREPARATION BEFORE RECOMMENDING IT FOR COTTON PLANTATIONS

V. LABONNE, (SG.181.0016)

Objective: After the series of tests of preparation, the best of these, retained for their efficacy and their price, are studied with more exactitude in more restricted experiments in order to obtain confirmation of their value.

Approach: Comparative experiments. Fisher block method, 7 repetitions, component plots with 6 rows of 18 m; 4 materials applied in 6 spraying each consisting of (a) Control: popularized dosage (Peprothion TM in 1972 was 2 l./ha.); (b) Preparation 1 (Peprothion HD in 1972: 3 l/ha.); (c) Preparation 2 (CRD 72-111 in 1972: 2.5 l/ha.); (d) Preparation 3: (CRD 72-102 in 1972: 2.5 l/ha.). Formulations of the popular insecticides in g./l. are as follows (Endosulfan: DDT: Methyl-parathion) (a) 216:300:108; (b) 160:400:90; (c) 300:0:200; (d) 0:400:200. One experiment was conducted in each of the regions of Sine- Saloum, Eastern Senegal, and Haute Casamance.

Results: The mixture "Endrin-DDT" (150 - 450g/l and 2.3 litres/ha.), then Peprothion TM, have been found to be of value in these experiments.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0172, TESTING OF INSECTICIDAL PREPARATIONS ON GROWING COTTON PLANTS

V. LABONNE, (SG.181.0017)

Objective: Search for the preparation that is most efficacious against one or more insect predators, and that is cheap and satisfies the following conditions to the maximum: Non-toxic for man (replacement for the organo-chlorine preparations); Non-phytotoxic; Persistent or transient, as the case may be; Specific or having an extended spectrum of activity, as the case may be.

Approach: Comparative experiments according to the Fisher-block technique, 8 repetitions, component plots with 6 rows of 18 m, X materials (variable according to the year) and for 1972 the formulation ratios (Methidathion: Endrin: Endosulfan: DDT: Methylparathion: Monocrotophos) mg./l. were as follows: for Peprothion (TM) 3 l/ha., (0:0:216:300:108:0); for Azodrin-DDT at 3.5 l./ha.; (0:0:0:150:0:300); for Endrin-DDT-NP at 3 l/ha., (0:100:0:340:100:0); for Nuvacron-DDT; (0:0:0:200:0:100); for Ultracide-DDT; (150:0:0:250:0:0). The sprayings were started (1 of 6) on the 45th day at 2-3 sites (1 per region).

Results: Endrin-DDT and Peprothion TM have been successfully popularized. The preparations based on monocrotophos are efficacious but dearer than the former two. They are persistent preparations with a wide spectrum of activity and have little or no phytotoxicity.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0173, EXPERIMENTS ON RATES OF APPLICATION FOR INSECTICIDE PREPARATIONS IN CULTIVATIONS OF COTTON

V. LABONNE, (SG.181.0018)

Objective: To determine the weakest dosage of each preparation retained for a satisfactory practical efficacy on one or several insect predators.

Approach: Factorial design experiment (dosages X preparations) were repeated 6 times on component plots of 8 rows, each 18 meters long with 1-4 materials tested each year. An analysis of the growth of the cotton plants, of the yield, and of the shedding will be conducted in 1971. The formulation ratios in g./l/ (Endosulfan: DDT: Methyl- parathion) of Peprothion (TM) is as follows: at 2 l/ha. (432:600:216); at 3 l./ha (648:900:324).

Result: The weakest dosage (2 l/ha. cotton plantation) has been as active as the stronger dosage (3 l/ha. cotton plantation) in 1971 in Haute Casamance. Consequently, and subject to reserve for confirmation, there is no cause for stepping up the dosage Peprothion TM.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0174, EXPERIMENTS WITH RHYTHMS IN INSECTICIDAL TREATMENTS

V. LABONNE, (SG.181.0019)

Objective: To make the intervals between insecticide treatments vary as a function of ecology in order to ensure the best protection.

Approach: 3 split-plot experiments. Study of shedding and of flowering.

Results: To advise an interval of 10 days between successive treatments, to shorten the intervals again towards the end of the campaign.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0175, STUDY THE PARASITIC FAUNA OF THE COTTON PLANT IN SENEGAL AND THE OPTIMAL NUMBER OF TREATMENTS

V. LABONNE, (SG.181.0020)

Objective: To determine the levels of parasitic infestation in natural conditions on treated plots. To determine the differences in parasitic specificity between the 3 main ecological zones. To determine the optimal number of treatments - by repetition of these experiments from one year to another, study of the evolution of parasitism in time.

Approach: Counting of all stages of the parasite (eggs, larvae, adults) on the plantation, in space and in time. These counts are made on untreated, treated and intensively treated plots.

Results: Evaluation of the population of the principal parasites in 1971 in three different zones. Optimal number of treatments (economy) equals 6.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

11.0176, STUDY OF CRYPTOGAMIC DISEASES AND OF ROTTING DISEASES OF COTTON PODS IN SENEGAL

R. LAGIERE, (SG.181.0021)

Approach: A systematic study, involving analysis of the causes of rotting of the pods

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

SIERRA LEONE

FOURAH BAY COLLEGE

Mount Aureol, Freetown

12.0001, CHROMOSOME CYTOLOGY

G.K. BERRIE, (SL.060.0001)

Objective: Investigator is working on sex chromosome mechanisms and polyploidy in Hepaticae. If research students are forthcoming, work in chromosome cytology will be extended to angiosperms, including local crop plants.

Progress: Satisfactory.

SUPPORTED BY University of Sierra Leone - Freetown

12.0002, ECOLOGICAL PARASITOLOGY

M.O. WILLIAMS, (SL.060.0002)

Objective: Very little is known of the helminth fauna of animals of Sierra Leone. The aim of the project is to make a complete catalogue of the helminth fauna of animals of economic importance. The vectors of the parasites are being identified and this biology worked out as a view of establishing methods for their control. Animals examined so far include fresh water and marine fishes, dogs, cattle, sheep, goats and poultry.

SUPPORTED BY University of Sierra Leone - Freetown

12.0003, PLANT PHYSIOLOGY

J.M. EZE, (SL.060.0003)

Objective: Investigator now working on the vitamin C content of local fruits and vegetables.

Progress - Satisfactory.

SUPPORTED BY University of Sierra Leone - Freetown

12.0004, ADSORPTIVE AND RETENTIVE PROPERTIES AND NATURE OF SOILS OF SIERRA LEONE

E.H. WRIGHT, (SL.060.0004)

Objective: Work involves study of the adsorptive and retentive properties of soil and correlation of these with the nature of surface groups, surface porosity and surface structure.

Progress - Satisfactory.

SUPPORTED BY University of Sierra Leone - Freetown

12.0005, GENERAL ECOLOGY OF ESTUARINE AND FRESH WATERS

A.I. PAYNE, (SL.060.0005)

Objectives: Experimental Growth in Fishes: Experimental work on the fundamental interrelationships of growth, food intake, body-weight, and age in the fishes. Project has run for three years. The principal aim is to outline the most predictable relationships of the above features and to assess the value of these relationships in estimating growth and food intake in natural populations using the most easily measurable parameters.

Approach: Estuarine Fishes: Following the seasonal cycle of the common estuarine fish species, including two Tilapia and four mullet- species, together with seasonal changes in physical and chemical aspects of their environment. The project has been carried out for two years now and the next step, which is now being pursued, is to estimate the benthic primary productivity and amount of detritus present in estuaries, as these are the most important sources of fish nutrient.

Limnology of Rivers of Sierra Leone: The major limnological features of the larger rivers and lakes of Sierra Leone are being determined. The seasonal variation is also being followed.

Results: As there is generally a correlation between productivity and the physical environmental aspects, an idea of the order of magnitude of the productivity of the waters of Sierra Leone can be achieved.

SUPPORTED BY University of Sierra Leone - Freetown

RICE RESEARCH STATION

Rokupr

12.0006, RICE VARIETAL IMPROVEMENT

H. WILL, (SL.071.0001)

Objective: To recommend and release the most productive rice varieties adapted to various ecological regions.

Approach: Using split-plot ramdomized layouts in the following experiments: introduction of foreign plant material; hybridization of different plants (foreign and local); comparative yield trials. These workers hope to select and release varieties.

Progress: The crops are now being harvested. From field performance, two hybrids (Upland x Swamp) might be released next year.

SUPPORTED BY Rice Research Sta. - Rokupr, Sierra Leone

12.0007, THE EFFECT OF PHYSICAL FACTORS ON GROWTH AND YIELD OF RICE

R.A. JONES, (SL.071.0002)

Objective: To observe whether physical factors such as cold and sound treatment increase the yield of rice.

Approach: On different ecological sites, cold and sound treated seeds are being grown under different fertilizer levels.

Progress: Work still in progress.

SUPPORTED BY Rice Research Sta. - Rokupr, Sierra Leone

12.0008, THE UPTAKE AND DISTRIBUTION OF NUTRIENTS BY THE RICE PLANT

R.A. JONES, (SL.071.0003)

Objective: To observe the movement of nutrients within the rice plant (particularly applied N).

Approach: Various plant parts analyzed to determine nutrient content. Results should lead to determine efficiency of fertilizer use.

Progress: Work still in progress.

SUPPORTED BY Rice Research Sta. - Rokupr, Sierra Leone

12.0009, THE CONTROL OF WEEDS BY HERBICIDES IN RICE CROPS

H. WILL, (SL.071.0004)

Objective: To screen and select herbicides in the control of weeds.

Approach: On different ecological sites apply varied herbicides at different rates. Randomized split plots. Tolerance of rice to herbicides observed.

Progress: Work still in progress. Significantly, hand weeding is the best method of controlling weeds on upland (rain fed) soils.

SUPPORTED BY Rice Research Sta. - Rokupr, Sierra Leone

12.0010, THE MINERAL REQUIREMENTS OF RICE

H. WILL, (SL.071.0005)

Objective: To observe the effects of macro and micro-nutrients on the growth and yield of rice.

Approach: On different ecological sites, macro - and micro-nutrients are applied at different times, doses and forms.

Progress: It has been recommended that phosphorus (single superphosphate) be applied at planting - (Boli, upland) or at transplanting (inland, Mangrove Swamps); Nitrogen, 3 weeks after transplanting/planting (1st 1/2 split dose) and at panicle initiation. Rates: Boli - 40 lbs. P2O5/acre; Mangrove Swamp - 60 lbs. N and 40 lbs. P2O5/acre; Inland Swamp - 70 lbs. N and 40 lbs. P2O5-/acre; Upland Swamp - 60 lbs. N and 40 lbs. P2O5/acre; work on micro-nutrients in progress.

SUPPORTED BY Rice Research Sta. - Rokupr, Sierra Leone

TOGO

CENTRE EXPERIMENTAL IRAT DE DAVIE

Davie, Tsevie

13.0001, STUDY THE POTENTIAL FERTILITY OF SOILS

G. DELCASSO, (TO.021.0001)

Objective: The question is to determine the notion of potential fertility expressed by the yield, in order to calculate the difference which exists between actual fertility and potential fertility, and thus the margin of progress foreseeable by agriculture at a more or less long date.

Approach: Setting up "Response curve" experiments with the 3 elements, N, P and K. In each experiment, one element alone is applied at varied rates, the other elements being liberally supplied.

Results: A deficiency in phosphorus is noted (60 kg of P2O5/-hectare). No efficacy of potassium to date. Efficacy of nitrogen (on maize) at the 3rd year of cultivation.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0002, MANIOC (CASSAVA) - PERIOD FOR PROPAGATION BY CUTTINGS AND DATE OF HARVEST

G. DELCASSO, (TO.021.0002)

Objective: Increase of yields.

Approach: A better knowledge of the cultivation cycle of manioc in order to determine, as a function of the period of plantng the cuttings, the best date for harvesting.

Results: The growth of the tubercles is accelerated in period of heavy rains. It decreases progressively in a dry season until it ceases. The evolution of the content in starches. The maxima are found in the dry season - the minima in the rainy season.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0003, PRODUCTION OF MAIZE AND MANIOC IN ASSOCIATED CULTIVATION

G. DELCASSO, (TO.021.0003)

Objective: Increase of yields.

Results: As a general rule when the sowing and the planting of cuttings are done at approximately the same time, a fall in the yields of the two associated plants is noted.

When the manioc cuttings are set 40 days after the sowing of the maize, a depressant effect on the maize is not noted; on the other hand, the yields of the manioc fall by about 30 percent. This fall in yield is due not only to the effect of the maize on the manioc but equally to the influence of the dates of setting cuttings on the yield of the manioc.

For all that, the total production per suface unit and per time unit is still favourable to the associated cultivation.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0004, FERTILIZATON OF MANIOC

G. DELCASSO, (TO.021.0004)

Objective: Increase of yield.

Results: Nitrogen: sight response to nitrogenous fertilization. Phosphate: no response to phosphate fertilization. Potassium: increase of 3,500 kg of roots for an application of 60 kg of K2O. No influence of fertilization upon richness in starches.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0005, STUDY OF THE TOGO NATURAL PHOSPHATE AS A BASIC FERTILIZER

G. DELCASSO, (TO.021.0005)

Objective: Is it the interest of the agriculturist to utilize as a basic fertilizer a tricalcium phosphate: "Togo phosphate"?

Approach: In the presence of a uniform fertilization (N plus K) comparison is made, within the framework of a rotation of crops, of an annual maintenance phosphate manuring applied in the form of dicalcium phosphate and of a basic phosphate manure applied on only one occasion in the form of the Togo phosphate. The quantities of P2O5 applied to the soil are equal in the two cases.

Results: The Togo phosphate had no effect in the year when it was buried, but it has brought important and regular increases in yields in the subsequent years. The soluble fertilizers give obviously superior yields, but if the cost of fertilizers and the value of the excess yields are taken into account, it is the Togo phosphate that gives the highest returns in profit.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0006, MODALITIES FOR USE OF THE TOGO PHOSPHATE

G. DELCASSO, (TO.021.0006)

Objective: How to improve the efficacy of Togo phosphate in the first few years.

Approach: To compare in the presence of a fertilizer (N plus K) different combinations of dicalcium phosphate and Togo phosphate - the dicalcium phosphate being progressvely replaced by the Togo phosphate.

Results: In the first year of cropping, the yields obtained with the different mixtures (Bic. plus Togo) are identical; the Togo phosphate used alone gives inferior yields.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0007, TILLAGE AND FERTILIZATION

G. DELCASSO, (TO.021.0007)

Objective: On account of the importance of the problems of soil physics for numerous tropical soils, their study and that of the techniques of tillage have been retained.

Approach: The experimental arrangement comprises 2 modalities for tillage. The traditional method with the DABA, and ploughing with a tractor using a plough having disks, combined with 3 levels of fertility. Without fertilizer equals 0. Rate I - N(40) P(40) K(30). Rate II - N(80) P(80) K(60).

Results: In the course of the first year of cultivation no evidence was found of the superiority of the one or of the other method. An important response to the fertilizer was noted even from the first application.

Network project see TO. 002.0004.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0008, STUDY OF MAINTENANCE FERTILIZATIONS
G. DELCASSO, (TO.021.0008)

Objective: The object of this study is to determine, after the correction of mineral deficiencies, thus raising the level of fertility, which fertilizers to apply to the crops to maintain this fertility.

Approach: For the elements capable of being stored in the soil, at least temporarily, i.e., essentially P2O5 and K2O, the following are tested: either a maintenance fertilization after several levels of correction; or several levels of maintenance fertilization in the presence of 2 levels of correction. The experimental work is conducted on continuous cultivation of maize.

Results: Potassium: In the presence of two levels of correction K(60) and K(120) the potassic maintenance fertilizations have had no effect at all on the yields of maize. Phosphorus: After application of 4 levels of correction (P equal 0) (P equals 40) (P equals 80) (P equals 120). If the maintenance fertilization is applied to the plots corrected at "P equals 40", the yields are the same or with slight increase only.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0009, NITROGEN BALANCE - NITROGENOUS FERTILIZATION AND ORGANIC MANURING
G. DELCASSO, (TO.021.0009)

Objective: The object of these studies on nitrogen balance is to study the storage of nitrogen in the soil by simultaneous applications of nitrogenous fertilizer and of straw.

Approach: The protocol adopted comprises 3 levels of nitrogen in the presence (or the absence) of 10 T/ha of organic material, not moistened (dry straw).

Results: On non-degraded ferralytic soils the increases in yields obtained by a single application of non-moistened organic material are very slight.

On degraded ferralytic soils the increase in yields obtained are important.

Network project see TO. 022.0002.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0010, SPECIFIC ROLE OF ORGANIC MATTER ON YIELDS
G. DELCASSO, (TO.021.0010)

Objective: The object of this experimental work is to acquire a better knowledge of the physical and chemical role of buried organic matter, in order to determine its specific effect on yields.

Approach: The study is conducted by curves of response to nitrogen with unifrom P plus K fertilizaton either in the presence or in the absence of two levels of organic matter, 0 and 10 T/ha of dry straw.

Results: On non-degraded, weakly ferralytic soil the application of 10 T/ha of dry straw does not in the first two years bring any notable increase in yields; the nitrogenous fertilizer combined with P plus K improves the yields in a very clear-cut manner, and does so from the first applicaton of N, at 40 units.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

CENTRE ORSTOM DE LOME

B.P. 375, Lome

13.0011, STUDY OF THE SOILS DEVELOPED ON THE CRYSTALLOPHYLLIAN BASE OF TOGO - CARTOGRAPHY AT 1/200,000TH OF THE SOUTHERN PART
A. LEVEQUE, (TO.190.0001)

STUDY OF THE SOILS DEVELOPED ON THE CRYSTALLOPHYLLIAN BASE OF TOGO - CARTOGRAPHY AT 1/200,000TH OF THE SOUTHERN PART

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

13.0012, CARTOGRAPHY AT 1/200,000 OF THE SOILS OF THE BASSARI DISTRICT
A. LECOCQ, (TO.190.0002)

Objective: Characterization and dynamics of the differentiations of the soils in landscapes with a long dry season.

Approach: Surveys of terrain and classical laboratory analyses, with an exceptionally high density of observations for this scale of cartography but necessary if the object is to encompass to a small extent the distribution of the soils in a relatively cut up landscape.

Results: The current pedogenetic processes play on some materials altered in ancient times and very much evolved, and more or less redistributed in the countryside in the course of the middle and recent quarternary period. The present tendency is for "large-scale leaching", the more severe since the geological substratum is less permeable (difference between schists and primary sandstones).

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

13.0013, RURAL COMMUNITIES AND THEIR TERRITORIES SEEN THROUGH THE VILLAGE MONOGRAPHS OF AGBETIKO AND BENA (TOGO)
B. ANTHEAUME, (TO.190.0003)

Comparative study of several village communities, and of the territory they control. Study of the efficiency of the traditional agrarian systems and of their transformations under the impact of the current endeavours for experimental development. Study of territories, topographical findings, inquiries. The traditional agrarian systems that are effective and well adapted to the environment are still capable of competing on the economic plane with the modern imported systems.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

13.0014, CARTOGRAPHY OF THE AGRARIAN ACTIVITIES OF TOGO
B. ANTHEAUME, (TO.190.0004)

Map of the homogeneous agrarian zones of Togo. Photo interpretation and verification on the site of some sixty tested zones of 25 square kilometres, topographical surveys, inquiries. Extreme variation between zones. Verification on the site is absolutely indispensable to preclude grave errors of analyses.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

13.0015, OCCUPATION AND DEVELOPMENT OF THE NEW COUNTRIES
E. LEBRIS, (TO.190.0005)

To demonstrate the channels of migrations from an over-populated zone towards peripheral reception zones in southeastern Togo.

Territorial monographs from inquiries, topographical surveys.

SUPPORTED BY Off. de Rech. Sci. Tech. Outre Mer - Fr.

DIVISION DES ETUDES PEDOLOGIQUES ET DE L'ECOLOGIE GENERALE

B.P. 1026, Lome

13.0016, RECONNAISSANCE AND EVALUATION OF THE SOILS OF TOGO
E.H. SANTANNA, (TO.161.0001)

Objective: 1) Pedological reconnaissance work at 1/200,000th - inventory of all the soils of Togo. 2) To designate the great pedological units presented and to give the approximate contours. 3) Sectorial maps at 1/10,00th and at 1/20,000th with the object of the extension of some specific plantations: manioc (cassava), cacao, oil palm etc.

Approach: The basic documents used are: topographical maps of IGN at 1/50,000th, 1/200,000th and at 1/20,000th. The geological maps of Togo: the existing pedological maps, aerial photographs, reconnaissance surveys, the small paths cut in the woods.

Results: Maps made: Maritime region of Togo at 1/50,000th; region of the Kara and of the Savannahs at 1/100,000th; the soils of Togo- Plantation - several sectors of Tsevie, Palime, Akposso etc. at 1/10,000th and at 1/20,000th. Maps in course of erection: Plateaux Region - Central Region.

SUPPORTED BY Inst. Polyvalent Rech. Econ. Rurale - Togo

PROJECT FAO/UNDP DE DEVELOPPEMENT DES RESOURCES FORESTIERES

B.P. 911, Lome

13.0017, TECHNIQUES OF CLEARING IN TEAK POPULATIONS OF EQUAL AGE
J.L. NIVELLE, (TO.800.0001)

Objective: To study different clearing techniques in populations of teak of equal age: selective or systematic clearings, and numerical clearings, with regard to execution of the work, the choice of select individuals, to afford them light.

Approach: Work on 5 comparative plots of from 1 hectare to 20 acres, planted at 2 x 2 metres, 15 years old, each (plot) treated in accordance with a different clearing technique: (1) removal of 1/3 of the population in number of standing trees, and this while lopping of the finest trunks; (2) removal of 1/2 of the population in number of standing trees, while lopping the finest trunks; (3) removal of one row in every two, in diagonal; (4) choice of 150 select individuals per hectare, freeing of 8 sites around the select tree - clearing of fixed intensity; (5) choice of 150 select individuals per hectare, intensity of clearing around the select tree variable as a function of the circumference of the select.

Treatment of the stumps with 245 T, to prevent the growth of new shoots. Per plot: 1 auxiliary control plot not treated, 1 treated with a strong dose (rate of application), 1 with a weak dose.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

13.0018, CARBONIZATION IN TRENCHES
L. PICARD, (TO.800.0002)

Objective: Fabrication of charcoal from the timber of different species (Savannah teak species) in large quantities and at a reduced price.

Approach: Study concerning a large trench of 30 cubic metres (5x3x2 m) and 2 small trenches of 7 cu.m (3x1.5x1.5 m) with the object of finding the best conditions for loading, draught and ventilation, system of lighting, duration of carbonization, dimensions of trenches, conditioning of the timbers used.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

13.0019, EXPERIMENTS WITH FERTILIZERS IN PLANTATIONS OF EUCALYPTUS CAMALDULENSIS
J.W. JANSEN, (TO.800.0003)

Objective: 1. Influence of lopping on the growth in height; 2. Influence of fertilizer on the growth in height.

Approach: Surface: 2 hectares - cleared by hand, ploughed with a Rome-Plow, planted beginning of June 1972; spacing 3 metres x 3 metres; 1 ha. cleared with a rotavator and the second ha. with a gyro-breaker; height measurement recorded at the beginning of September. These measurements did not reveal any difference in height for these two plots treated differently; fertilizer experiment commenced in September. Treatments: 0: no fertilizer; 1: N (nitrogen); 2: NP (nitrogen plus phosphorus); 3: NPK (nitrogen plus phosphorus plus potassium). Rate of Application: N: 30 or ammonium sulphate 150 kg/ha; P: 23 or triple superphosphate 50 kg/ha; K: 15 or potassium sulphate 33 kg/ha. For each type of tillage: 2 repetitions.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

13.0020, PRICKING OUT IN A NURSERY
J.F. GREGERSEN, (TO.800.0004)

Objective: To determine the optimal spacing for the pricking-out of seedlings of Cordia alliodora in a nursery.

Approach: Seedlings of Cordia alliodora have been pricked-out in nursery beds at 4 different spacings: 15x15 cm., 25x25 cm., 35x35 cm., and 45x45 cm.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

13.0021, FUMIGATION OF THE SOIL IN A NURSERY
J.F. GREGERSEN, (TO.800.0005)

Objective: a) To reduce the losses on plants caused by insects. b) To eliminate the labour of weed destruction.

Approach: a) Preparation of 40 square metres of nursery bed by Rotavator. b) Application of Terabol (methyl bromide). c) Sowing with seeds of Sterculia foetida.

SUPPORTED BY Food & Agric. Org. of the U.N. - Rome, It.

STATION IFCC DE TOVE

B.P. 90, Palime

13.0022, PHYTOTECHNICAL STUDIES ON METHODS OF PLANTATION OF CACAO-TREES

J. BESSE, (TO.061.0001)

Objective: Research on the best methods for planting new hybrid varieties under three different basic climatic conditions.

Approach: Setting up experiments in the form of randomized Fisher blocks to enable the testing of the principal methods recommended: under plantain banana plants, between hedges of Flemingia congesta, under Gliricidia, between hedges of natural regrowth (enriched with Gliricidia, or not), under managed forest.

Results: Experiments in progress.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Palime, Togo

13.0023, IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY VEGETATIVE MEANS

J. CAPOT, (TO.061.0002)

Objective: Increase of yields. Resistance to climatic and biological hazards. Research for a better commercial quality.

Approach: Prospection and introduction of planting material. Installation of collections. Establishment of clonal selection and multilocal experiments. Creation of propagation enclosures. Multiplication from cuttings and propagation of elite clones.

Results: The obtaining of clones highly productive of a good quality coffee (granulometry superior to that of the local Niaouli variety). Propagation commenced.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Palime, Togo

13.0024, GENERATIVE IMPROVEMENT OF THE CACAO-TREE (THEOBROMA CACAO L.)

J. BESSE, (TO.061.0003)

Objective: The obtaining of selected high-producing vigorous hybrids presenting a good tolerance to the hazards (notably the virus of Swollen-shoot), and having satisfactory commercial qualities.

Approach: Constitution of a collection of clones or introduced populations. Comparative experiments with interclonal hybrids. Statistical interpretation of the results. Reconstitution of the selected hybrids in biclonal seeding fields and distribution of hybrid pods.

Results: Experiments in progress.

SUPPORTED BY Inst. Fr. du Cafe et Cacao - Palime, Togo

STATION IRAT DE TOAGA

B.P. 16, Mango

13.0025, THE TOGO PHOSPHATE AS AN ANNUAL FERTILIZATION

G. DELCASSO, (TO.022.0001)

OBJECTIVE: Possibilities of using Togo phosphate for annual fertilization.

APPROACH: In the presence of a single fertilization (N plus K) in the framework of a Sorghum-Arachis crop succession, comparison is made of annual fertilizations with dicalcium phosphate at "unit" application rates identical with Togo phosphate. From the second year of cultivation (and in the succeeding years) the dicalcium phosphate is replaced by the Togo phosphate: two control treatments are kept, the one receiving only soluble phosphate, the other receiving Togo phosphate only.

RESULTS: The Togo phosphate has had an effect even if it is used alone. The yields obtained with the soluble phosphate are arithmetically superior but the differences are not significant. The fertilizations in which the soluble form is used alone or associated with tricalcium give the highest gross returns, but the money invested in the purchase of the fertilizers is more profitably spent when there has been only application of Togo phosphate.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0026, NITROGEN BALANCE - MINERAL FERTILIZATION AND ORGANIC MANURING

G. DELCASSO, (TO.022.0002)

OBJECTIVE: The object of the "nitrogen balance" experiments is to study the possibilities of storage of nitrogen in the soil by simultaneous applications of nitrogenous manures and of straw.

APPROACH: The protocol adopted comprises 3 levels of nitrogenous manuring in the presence (or the absence) of 10 T/ha of non-moistened organic matter (dry straw).

RESULTS: After 2 years of cultivation of sorghum the following effects are noted: on the one hand, an important effect of the nitrogenous manuring when it is used alone; on the other hand, that the nitrogen and the straw interact with one another, the straw improving the efficacy of the nitrogenous manuring.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0027, SPECIFIC ROLE OF ORGANIC MATTER ON YIELDS

G. DELCASSO, (TO.022.0003)

OBJECTIVE: The object of this experimental work is to acquire a better knowledge of the physical and chemical role of buried organic matter in order to determine its specific effect on yields.

APPROACH: The study is conducted by experimental "curve of response to nitrogen" with one uniform P plus K fertilization, in the presence (or absence) of two levels of organic manuring (0 or 10 T/ha of dry straw).

RESULTS: On the tropical ferruginous soils of norther Togo in the first year of cultivation, the burial of dry straw has had a depressant effect on the yields.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0028, TILLAGE AND FERTILIZATION

G. DELCASSO, (TO.022.0004)

OBJECTIVE: To know the effects of different techniques of tillage in the presence or in the absence of a mineral fertilization.

APPROACH: The experimental arrangement comprises 3 modalities for tillage: working with the "Daba" - making of ridges, ploughing with the plough drawn by oxen combined with 4 levels of manuring - (rates of application 0 - 1 - 2 - 3.)

RESULTS: Of the results of the first two years in a succession of sorghum-arachis, the following are noted: the superiority of the ridge to the other modalities for tillage, and in all cases a good response to the mineral manure applied.

Network project: see TO. 021.0007.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0029, STUDY THE POTENTIAL FERTILITY OF SOILS
G. DELCASSO, (TO.022.0005)

OBJECTIVE: The question is to determine the notion of potential fertility expressed by the yield in order to calculate the difference which exists between the actual fertility and the potential fertility, thus the margin of progress that can be envisaged by agriculture.

APPROACH: Setting up of "curve of response" experiments to the 3 elements (N, P, K). In each experiment one element alone is applied at variable rates, the other elements being supplied liberally.

RESULTS: The possible yields in the climate under consideration and with the current varieties are: 20 q/ha (quintal (equals hundredweight) per hectare) for sorghum; 30 q/h/a for groundnuts; A deficiency in P2O5 is noted (80 kg/ha); Up to the present time the potassic fertilization has been without effect.

Network project: see TO. 021.0001.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0030, STUDY OF MAINTENANCE FERTILIZATIONS
G. DELCASSO, (TO.022.0006)

OBJECTIVE: The object of this study is to determine, after correction of mineral deficiencies, thus raising the level of fertility, which are the manures to be applied to the crops in order to maintain this fertility.

APPROACH: For the elements capable of being stored in the soil at least temporarily, i.e., essentially P2O5 and to a lesser degree K2O, the following are tested: either a single maintenance fertilization after several levels of correction; or several levels of maintenance fertilization in the presence of two levels of correction.

RESULTS: With regard to the phosphatic fertilization, the level of the yields is examined in the second year as soon as a uniform fertilization of 40 units of P has been applied. With regard to the potassium applied at two rates (K30) and (K60) in the presence of N plus P the differences in yields are not significant in the first year of cultivation.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0031, BEHAVIOUR OF PLUVIAL RICE (VARIETIES X FERTILIZATIONS)
G. DELCASSO, (TO.022.0007)

OBJECTIVE: Study of the behaviour of 3 varieties of pluvial rice.

APPROACH: With and without mineral fertilization, comparison is made at two different dates of sowing, of the behaviour of 3 varieties of rice. As a reference control the local rice is used.

RESULTS: The increase in yields due to fertilization are important, the yields are doubled. The early date for sowing is advised for the varieties that have a long cycle. The varieties that have a short cycle adapt themselves better to a late sowing.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

13.0032, MINERAL FERTILIZATION - DETERMINATION OF DEFICIENCIES
G. DELCASSO, (TO.022.0008)

OBJECTIVE: Study of the determination of mineral deficiencies - approach for the determination of a fertilization.

APPROACH: Carried out by factorial experiments of 2 x 2 x 2 x 2 type sowing done at two different times and on the same dates as for the studies on behaviour (See TO. 022. 0007).

RESULTS: Economically commended fertilization - 40 units of N from urea f; 40 units of P - triple superphosphate.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Lome, Togo

STATION IRCT D'ANIE MONO

B.P. 1, Anie

13.0033, IMPROVEMENT OF VARIETIES OF COTTON (BARBADENSE) GROWN IN ASSOCIATED CULTIVATION
G. ANO, (TO.041.0001)

Objective: Selection within a population in order to improve productivity and the technological characteristics of the cotton tree grown in associated cultivation.

Approach: Mass pedigree selection with three repetitions.

Results: Propagation each year of a nucleus of seeds sown for multiplication outside the station. Propagation of the Mono varieties.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0034, VARIETAL EXPERIMENTATION WITH COTTON (ASSOCIATED CULTIVATION) G. BARBADENSE
G. ANO, (TO.041.0002)

Objective: To detect among the varieties attested on the station those which are the most suited to this type of traditional cultivation.

Approach: Comparative experiments in pure and associated cultivation, 5 to 8 repetitions - associations with maize and yams.

Results: Propagation of the Mono varieties.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0035, INTRASPECIFIC HYBRIDATION OF COTTON (G. BARBADENSE)
G. ANO, (TO.041.0003)

Objectives: Creation of a material with long fibre and great tensile strength, adapted ecologically.

Approach: Crossings and back crosses between local (Mono) types and sires of high quality (Sea Island). Pedigree selection followed by mass pedigree selection.

Results: Attestation of the Hyfi varieties.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0036, COTTON - PRODUCTION OF F1 HYBRIDS - GOSSYPIUM HIRSUTUM X G. BARBADENSE
G. ANO, (TO.041.0004)

Objective: To profit by the heterosis due to the crossing between two species for the production of seeds.

Approach: Utilization of the male sterility found with G. hirsutum.

Results: Not to definitive - the study should be continued.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0037, COTTON - STUDY OF THE MALE STERILITY IN GOSSYPIUM HIRSUTUM

G. ANO, (TO.041.0005)

Objectives: To provide sterile male strains for a scheme of production of F1 seeds.

Approach: Conservation of the sterile-male strains. Localization of the sterility genes. Modification of the sterile-male effect.

Results: Isolation of three sterile-male strains that can be utilized for a scheme of production of F1 seeds.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0038, VARIETAL IMPROVEMENT OF COTTON (G. HIRSUTUM)

G. ANO, (TO.041.0006)

Objective: To choose the variety best adapted to intensive pure cultivation.

Approach: Introductions and collection - varietal experiments on the station - network of regional experiments (9 varieties, 9 repetitions - plots with three rows).

Results: Propagation of the Allen variety in large-scale cultivation.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0039, PRODUCTION OF COTTON HAVING SEEDS FREE FROM GOSSYPOL

G. ANO, (TO.041.0007)

Objective: To explore the possibilities of production of cotton trees having seeds free from gossypol, enabling the preparation of a flour rich in protein fit for use in human nutrition.

Approach: Introduction of varieties having seeds free from gossypol.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0040, EXPERIMENT ON INSECTICIDAL PROTECTION OF COTTON PLANTS

G. ANO, (TO.041.0008)

Objective: To evaluate the relative efficacy in Togo of several insecticial compounds already selected in some other states.

Approach: Field of 1 ha. of the Mono variety (Gossypium barbadense), divided into 5 plots of equal surface area. 5 preparations compared: Endrin-DDT (150-450 g/ha), Peprothion TM, HOE 2960, S 137b, Ca 6900 - Dosage: 2-3 litres/ha/application. 5 sprayings.

Result: Has not yet been analysed.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0041, STUDY OF THE MINERAL DEFICIENCIES OF THE SOILS OF TOGO AND THEIR EVOLUTION

N. DOSSOU, (TO.041.0009)

Objective: I) To study the deficiencies or the development of deficiencies in all regions of Togo. II) Cartography of the mineral deficiencies of soils in Togo.

Approach: 11 withholding experiments (N S P K) distributed over the 5 large economic regions - 6 materials - 8 repetitions - Component plots with 4 rows of 30 metres - 1st cycle; continuous cultivation: maize; 2nd cycle: cotton.

Results: In 1970 a depressant effect of nitrogen was noted; this was attributed to a N/P imbalance, verified by foliar analyses. These reactions have disappeared in 1971.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0042, STUDY THE DEVELOPMENT OF MINERAL DEFICIENCIES IN THE COURSE OF ROTATION OF CROPS, 1968-1975

N. DOSSOU, (TO.041.0010)

Objective: Study of the development of mineral deficiencies within the framework of an appropriate rotation comprising periods of fallow.

Approach: 6 materials - foliar analyses - comparison of the contents in N P S and K and their critical level.

Results: Nitrogen: Close correlation between yield and N content of the leaf. Phosphorus: Highly significant deficiency. Sulphur: Deficiency which becomes apparent in the comparison between S content of the leaf and critical level. Potassium: No agreement between analysis of the leaf and agronomic result. Boron: Contents inferior to the theoretical critical level, nevertheless without manifestation of foliar signs of deficiency.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0043, AGRONOMIC-ECONOMIC STUDY OF THE NATURAL PHOSPHATES OF TOGO

N. DOSSOU, (TO.041.0011)

Objective: In view of the presence of these beds, to demonstrate the activity of these phosphates, as a basic fertilizer, on the very deficient soils on the perimeter. Study of the cost price.

Approach: 3 sites for experiments - 6 materials - foliar analyses.

Results: The efficiency is estimated by the increase in harvest yield over two years per kg of P2O5. There would be no short-term interest in transporting large quantities of natural phosphate from Anicho into the North of the country.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0044, EXPERIMENT ON PLANTATION DENSITY

N. DOSSOU, (TO.041.0013)

Objective: To specify the data for distance apart in the row and number of plants per seed-hole.

Approach: 6 materials, 8 repetitions - 1st cycle: maize - 2nd cycle: cotton. Standard manuring.

Results: The inter-row effect is weak but significant. It will always be advantageous to sow with a distance between rows of 0.70 m. The interplant effect is very important, highly significant; it must be interpreted as a function of interactions between interplant distance, year, and date of sowing.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0045, STUDY THE PLACE OF MANURING IN A SUCCESSION OF MAIZE - COTTON

N. DOSSOU, (TO.041.0014)

Objective: To ascertain whether, to obtain better value from manure, it is suitable to apply it as a total application before the one or the other crop or to divide it between the two.

Approach: 4 materials, 8 repetitions.

Results: Better results with divided manuring.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0046, STUDY OF THE EFFECT OF NITROGENOUS FERTILIZATION ON THE COTTON PLANT

N. DOSSOU, (TO.041.0015)

Objective: a) To specify the requirements of nitrogen of the cotton plant from sowing up to the 100th day. b) To ascertain the optimum period to satisfy this requirement.

Approach: Five materials - ten repetitions - fractionated periodic applications - previous sampling of leaves for diagnosis. Results: Applications of nitrogen are very beneficial up to the 40th day with a production increment of 14 kg-ha of cotton seed per kg of nitrogen spread.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0047, STUDY OF THE MAINTENANCE OF FERTILIZATION

N. DOSSOU, (TO.041.0016)

Objective: Is it possible to maintain the fertility of a soil, observed in the first year of cultivation, with the aid of a mineral fertilization compensating the mineral uptake of the two annual crops (maize - cotton)? What assistance can be given by a natural or improved fallow?

Approach: 6 materials, 4 repetitions combining with a control left uncultivated until 1974, one cycle of natural fallow and fallow without leguminous plants, one cycle of cultivation of 1.4 - 2.2.1 - 2.3.

Results: Certain transitory periods of impoverishment were observed to be a function of the recorded rainfall.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0048, EXPERIMENT DURATION OF FALLOW

N. DOSSOU, (TO.041.0018)

Objective: To demonstrate the improving effect of a fallow, on the level of fertility of a soil supporting two annual crops and which may nevertheless receive a compensatory mineral fertilization.

Approach: 4 rotations: Yams - Arachis - Cotton - Maize - Haricot beans - Rice; 3 crops in continuous cultivation. 2 and 3 years of fallow; 2 without plants; with and without mineral fertilizer.

Results: The first soil analyses show that on sandy soils poorly provided with organic matter, there is cause for anticipating (the need for) a complete and frequent mineral fertilization.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0049, EXPERIMENT ON CHEMICAL WEEDING OF A COTTON PLANTATION WITH 3 HERBICIDE PREPARATIONS

N. DOSSOU, (TO.041.0019)

Objective: To facilitate growth of cotton plants at the outset by eliminating competition by weeds during the first 30 days.

Approach: One observation plot of 24 x 2 m per dosage rate for each preparation, plot subdivided into 8 sub-plots. Technique repeated twice. Three preparations used in the experiments and each used at three rates of application in 400 litres of water per hectare: Cotoran: 2kg/ha, 1.5 kg/ha, 3 kg/ha; NVO A: 4 kg/ha, 3.0 kg/ha, 6 kg/ha; BASF 3660: 8 kg/ha, 6.0 kg/ha, 12 kg/ha. Spraying on the soil, 2 days after sowing. The herbicidal evaluation is made in accordance with 3 criteria: visual counting at 15, 30 and 45 days after sowing; counting with the aid of the Du Plessis grid; weighing of the weeds.

Result: Cotoran is shown to be superior to the other two preparations from the first fortnight and its persistence is longer. The rate of application of 3 kg/ha seems to be the best and the persistence is up to 45 days.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0050, TEST OF POSSIBLE PHYTOTOXICITY FOR COTTON PLANTS OF COMPOUNDS WITH HERBICIDAL ACTIVITY

N. DOSSOU, (TO.041.0020)

Objective: Demonstration of a possible phytotoxicity for cotton plants to compounds having herbicidal activity.

Approach: One observation plot of 24 x 2 m per dosage of preparation, plot sub-divided into 8 sub-plots. Arrangement repeated twice. Four test preparations and two dosages (single and double) in 400 litres of water per hectare: 1) Alachlore: 2 kg/ha and 4 kg/ha; 2) Diuron: 2 kg/ha and 4 kg/ha; 3) Fluometuron (Cotoran): 3.2 litres/ha and 6.4 l/ha; 4) Prometryne plus Ametryne (Gesaten): 1.8 kg/ha and 3.6 kg/ha. Spraying on the soil the day after sowing. The evaluation of phytotoxicity is made in accordance with criteria: 1) the number of seedlings up at 15 and 30 days; 2) the growth in height at 60 and 120 days; 3) flowering; 4) production of cotton-seed.

Result: Alachlore alone seems not to be phytotoxic when it is used at double dosage. Diuron is the most phytotoxic in this case. At single dosage, the differences are not appreciable.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0051, COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT KOUVE (MARITIME REGION)

N. DOSSOU, (TO.041.0021)

Objective: To obtain more and more precise indications for the establishment of a formula for the cheapest and most efficient fertilizer.

Approach: Comparative pluriannual experiment, Fisher block method, 8 repetitions, component plots of 6 rows of 25 metres, 4 test materials: 1) Control without manuring; 2) Copious manuring, 65N, 23S, 57P, 108K; 3) Manuring in popular use 32N, 11S, 19P, 60K; 4) Another formula 40N, OS, 36P, 36K. Maize, not manured, in first cycle, then cotton. Application as side-dressing at sowing.

Result: In 1970, the production of the manured plots did not differ from each other and were little better than that of the non-manured control. In 1971, the reaction to manuring has been very noticeable (250 percent of the non-manured control but producing 978 kg/ha). The copious manuring is in the lead on account of the very severe deficiencies in P and K which have been revealed in the experiment.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0052, COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT EAST-MONO (PLATEAUX REGION)

N. DOSSOU, (TO.041.0022)

Objective: To obtain more and more precise indications for the establishment of a formula for the cheapest and most efficient fertilizer.

Approach: Comparative, pluriannual experiment, Fisher block method, 8 repetitions, component plots of 6 rows of 25 metres, 5 test materials: 1)Non-manured control; 2) Without manuring at sowing and 22.5N at 50 days; 3) Old Plateaux formula: 53N, 34S, 22P, 0 K; 4) New plateaux formula: 43N, 11S, 25P, 30K; 5) Formula in popular use: 52N, 30S, 30P, 0 K. Maize,

not manured, as preceding crop. Application as side-dressing at sowing, except for 22.5N applied at 50 days.

Result: The 3 formulas with application at sowing give almost identical results, and the best. The K of the new formula has remained without apparent effect in 1970. It is the N that scores. Same result in 1971.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0053, COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT NIANGOULAME AND AT THE PILOT CENTRE AT KABOU

N. DOSSOU, (TO.041.0023)

Objective: To obtain more and more precise indications for the establishment of a formula for the cheapest and most efficient fertilizer.

Approach: 2 comparative, pluriannual experiments, Fisher block method, 8 repetitions, component plots of 6 rows of 25 m, 4 test materials: 1) Control without manuring; 2) 1969 Centre formula: 50N, 31S, 29P, 0 K, 1.1 Bo; 3) 1970 Centre formula: 43N, 11S, 24P, 30K, 1.1 Bo; 4) Commercial formula; 52N, 30S, 30P, 0 K, 0 Bo. Maize not manured, as crop preceding cotton. Application as side-dressing at sowing, except for 22.5N at 50 days.

Results: The 1970 Centre formula gives a higher production (1405 kg/ha) than the two other formulas and is identical and equal to 163 percent of the control (788 kg.). The foliar analyses show that the superiority of the 1970 formula results from its potassium. Nitrogen is the principal limiting factor. Same results in 1971. The 1970 formula therefore seems well adapted to the region. The results of the KABOU experiment are comparable to those at NIANGOULAME and the conclusions are the same.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0054, COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT KADJALLA (THE KARA REGION)

N. DOSSOU, (TO.041.0024)

Objective: To obtain more and more precise indications for the establishment of a formula for the cheapest and most efficient fertilizer.

Approach: Comparative, pluriannual experiment, Fisher block method, 8 repetitions, component plots of 6 rows of 25 m, 4 test materials: 1) Control without manuring; 2) 1969 Kara formula: 43N, 23S, 45P, 0 K, 1.1 Bo; 3) 1970 Kara formula: 52N, 11S, 48P, 30K, 1.1 Bo; 4) Commercial formula: 52N, 30S, 30P, 0 K, 1.1 Bo. Application as side-dressing at sowing, except for 22.5N at 50 days.

Result: The 1970 formula, with K, is far superior, with regard to the production of seed-cotton (plus 12 percent), to the other pesticides, which, themselves, are equivalent to 170 percent of the control (having a value of 1056 kg/ ha). The deficiencies in nitrogen, phosphorus and potassium are very severe. The foliar analysis shows that the 1970 formula is that which leads to the foliar composition which is the nearest approach to the optimal.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

13.0055, COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT DAPANGO (SAVANNAH REGION)

N. DOSSOU, (TO.041.0025)

Objective: To obtain more and more precise indications for the establishment of a formula for the cheapest and most efficient fertilizer.

Approach: Comparative, pluriannual experiment, Fisher block method, 8 repetitions, component plots with 6 rows of 25 m, 4 test materials: 1) Control withou manuring; 2) 1969 Kara formula: 43N, 23S, 45P, 0 K, 1.1 B; 3) 1970 Kara formula: 52N, 11S, 48P, 30K, 1.1 B; 4) Commercial formula: 52N, 30S, 30P, 0 K, 1.1 B. Application as side-dressing at sowing, except for 22.5N at 50 days.

Result: The three fertilizers do not differ among themselves but are far superior to the non-manured control (238 percent of 542 kg). The foliar analyses show an insufficient compensation of the phosphorus deficiency by the applications of P.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

UPPER VOLTA

INSTITUT DE RECHERCHES AGRON. TROP. ET DES CULTURES VIVRIERES

Agence en Haute Volta, B.P. 596, Ouagadougou

14.0001, IMPROVEMENT OF EARLY SORGHUMS BY SELECTION OF THE LOCAL MATERIAL

C. ROBLEDO, (UV.020.0001)

Objective: Research for traditional varieties resistant to drought for the zone with recorded rainfall less than 700 mm, and resistant to lodging.

Approach: Experimental work on the material in collection and genealogical selection on the best ecotypes - ongoing researches at outstation of Tankoulounga.

Results: One early variety resistant to drought, productive but with poor quality grain equals BELKO. One variety in the course of being confirmed, of good quality grain equals NONGOM-SOBA.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0002, INTRODUCTION OF FOREIGN EARLY SORGHUMS

C. ROBLEDO, (UV.020.0002)

Objective: Research for varieties with short straw, resistant to drought, for the zone of recorded rainfall less then 700 mm, more productive than the traditional varieties and having glossy enough grain.

Approach: 1) Introduction of fixed material originating from Senegal, from Niger, from the U.S.A. and experimental work on this material in the framework of (IRAT STRC)co-operative experiments. 2) Introduction of material in disjunction from the same countries (in F3, F4, F5) and continuance of the genealogical selection with experimental work up to fixation. Researches going on at outstation at Tankoulounga.

Results: One early variety with medium straw, resistant to drought, with high productivity but mediocre quality of the grain: 137 - 62 x Janjare/8 (Niger). One early variety with short straw, of medium productivity and good quality grain, without anthocyanosis equals CE 90 (Senegal).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0003, INTRODUCTION OF FOREIGN EARLY MATERIAL - SMALL MILLET

C. ROBLEDO, (UV.020.0003)

Objective: Research for early varieties resistant to drought (zone with less than 600 mm. recorded rainfall) and more productive than the local control.

Approach: Multilocal experimental work on introductions in the framework of IRAT co-operative experiments. Researches going on at outstation at Dori.

Results to date: One variety from Niger: P3 KOLO with a yield regularly superior to that of the control.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

SECTION CTFT DE HAUTE VOLTA

B.P. 303, Ouagadougou

14.0004, INDEX OF EROSION BY THE RAIN IN UPPER VOLTA

J.P. GALABERT, (UV.090.0001)

OBJECTIVE: Map of Index of erosion by the rain in Upper Volta.

APPROACH: Study of all the pluvigraphical records at the official and associated stations of the National Meteorological Service: 1) Calculation of the R index of the Wischmeier equation; 2) Hyetograms (rainfall maps) of the exceptional precipitations having more than 100 points (U.S.A.).

RESULTS: Publication in December 1972 of the results for the years 1966, date of the installation of pluviographs with a 24-hour rotation, to 1972. Provisional map of the Index of erosion by the rain (R Index). Hyetograms of the exceptional precipitations.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

14.0005, INFLUENCE OF WIND-BREAKS IN AN IRRIGATED PERIMETER

J.P. GALABERT, (UV.090.0002)

OBJECTIVE: Influence of wind-breaks in an irrigated perimeter.

APPROACH: Installation at the outstation at Donse of 5 thermographs - 1 anemometer - 5 hygrographs - aspiration psychrometer. Field balance of INRA type (accuracy 1 mg) for the study of the transpiration of plant material under cover or without shelter. Study of the factors: temperatures - air humidity - saturation deficit.

RESULTS: Apparatus in the course of installation.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

14.0006, TRIALS OF EUCALYPTUS OF DIFFERENT ORIGINS

J.P. GALABERT, (UV.090.0003)

OBJECTIVES: Trials of Eucalyptus from different sources; choice by elimination.

APPROACH: Plantation at the outstation at Gonse of 18 species and origins of Eucalyptus. Plantation on rootage with a depth of 50 cm. Origin of the seeds: F.T.B. Australia. Statistical arrangement. Measurements in heights and circumferences.

RESULTS: The first experiments have enabled the release of some ten origins. These experiments are to be confirmed. Eucalyptus camaldulensis 8298 and Eucalyptus camaldulensis 8038 are being released from the other origins.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

14.0007, INTRODUCTION OF FORAGE SHRUBS INTO AN ARID ZONE

J.P. GALABERT, (UV.090.0004)

OBJECTIVE: Introduction of forage shrubs and cover plants into an arid zone.

APPROACH: Experiments at the outstation at Dori on behaviour of leguminous shrubs and of Atriplex after integral protection of the experimental plot.

SUPPORTED BY Centre Tech. For. Trop. - Niamey, Niger

STATION AGRICOLE IRAT DE KAMBOINSE

Kamboinse

14.0008, NITROGENOUS FERTILIZATION FOR AQUATIC RICE

C. POISSON, (UV.024.0001)

National network project - see UV.022.0018. (14.0061)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0009, VARIETAL IMPROVEMENT OF AQUATIC RICE BY INTRODUCTION

C. POISSON, (UV.024.0002)

National network project - see UV.022.0019. (14.0062)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

STATION AGRICOLE IRHO DE NIANGOLOKO

Niangoloko par Banfora

14.0010, CULTIVATION OF GROUNDNUTS IN ANACARDIUM (CASHEW NUT) PLANTATION DURING THE FIRST FEW YEARS OF DEVELOPMENT OF THE TREE

P. GILLIER, (UV.061.0001)

Objective: To obtain a return from the land while awaiting the first crops of nuts, either from groundnuts or from sesame.

Approach: Comparative experiments and behaviour studies, research on the portions to leave free around the plantation holes.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0011, UTILIZATION OF OLEAGINOUS ANNUALS ON IRRIGATED PERIMETERS

P. GILLIER, (UV.061.0002)

Objective: The crop successions rice - tomato or late rice - late rice, set problems as to ground preparation. Early rice - tomato, or early rice - late rice leave a period in which the soils are not in use. The oleaginous plants should make it possible to arrange that this "empty" period occurs in a dry season or in winter time.

Approach: Behaviour experiments with early varieties of groundnuts, of soya and of sesame.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0012, IMPROVEMENT OF SESAME BY HYBRIDATION

P. GILLIER, (UV.061.0003)

Objective: To increase the productivity, the quality of the seed and the oil contents in sesame.

Approach: The following are inter-crossed: 1st/ the most adapted varieties found in collection. 2nd/ varieties that are far removed in both origin and characteristics.

Results: The first selections are compared in trial. Identical to the best of the present-day varieties from the point of view of yields, they have seeds of better quality.

The experiments of second crossings are still at the stage of progeny study.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0013, VERIFICATION OF TECHNIQUE IN RURAL ENVIRONMENT IN PILOT CULTIVATIONS

P. GILLIER, (UV.061.0004)

Objective: To demonstrate by example the authenticity of the popularized methods and to promote while studying it a pilot improvement of land in the form of team cultivation.

Approach: Creation of a community farm in 1961, which has since become the property of a single individual, the others creating their own improvement scheme. Traditional agriculture of the region. Working with oxen. Rotation of three years of crops, 3 years of fallow. 2 hectares of maize, 1 ha. of groundnuts, ha. 1/2of sesame, ha. 1/2 of Cajanus. Garden with aubergine.

Results: Repayment of advances for installation over 6 years at least. Raising of the level assured. Necessity for the first 3 years of a very closely knit and qualified team of workers (skeleton staff).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0014, CONTINUOUS CROP ROTATION WITH MANURE

P. GILLIER, (UV.061.0005)

Objective: To judge the advantage of using fallow in relation to continuous rotation with moderate application of manure.

Approach: Rotations studied: 1/ - Groundnuts - Millet; 2/ - Groundnuts - Millet - Maize; 3/ - Groundnuts - Maize; 4/ - Groundnuts, continuous; 5/ - Groundnuts - Millet - Fallow - Fallow; 5 tons of fold or pen manure (from animal enclosures) on groundnuts and maize.

Results: The yields are maintained at a satisfactory level without decreasing from year to year. A slight advantage in the use of the fallow. The most varied rotations are the best. Continuous cultivation of groundnuts is to be discouraged on account of parasitism (chlorosis and cerospora).

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

UPPER VOLTA

14.0015, CHLOROSIS ON GROUNDNUTS AND LEGUMINOUS PLANTS

G. GERMANI, (UV.061.0006)

Objective: To look for the agent of a chlorosis that has appeared on leguminous plants, and for the means of control.

Approach: Nematological sampling - Attempts at treatment with Nemagon. Research of plant hosts in collaboration with the O.R.S.T.O.M.

Results: The preparation Nemagon (50 litres/hectare) prevents the disease from appearing. The agent is a nematode (Aphasmatylenchus straturatus germani).

The disease appears after a certain time of vegetation (50 days in the case of the late groundnut varieties), and disappears during the end of the cycle. Other host plants: Cajanus indicus, Glycine Max- Tephrosea. The disease appears to affect only leguminous plants. Causes loss of 25 percent to 60 percent of yields.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0016, RESEARCH FOR LATE VARIETIES OF GROUNDNUTS RESISTANT TO "ROSETTE"

P. GILLIER, (UV.061.0007)

Objective: To improve the productivity of groundnuts with a long cycle and resistant to "Rosette".

Approach: Prospecting - Studies on progeny - Hybridation - Comparative varietal experiments both at the Station and Multilocal.

Results: Groundnut cultivars of high productivity and resistant to "Rosette". Cycle of 150 days.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0017, CREATION OF "EATING" VARIETIES OF GROUNDNUTS

P. GILLIER, (UV.061.0008)

Objective: To develop in the South zone (of Upper-Volta) a population of groundnuts that can be marketed as "eating" quality groundnuts, more remunerative for production.

Approach: Crossing between new resistant early varieties and "eating" variety (Valencia early) and destined to be classified as shelled.

Results: Research in progress. Studies of progeny.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

STATION AGRICOLE IRHO DE SARIA

B.P. 21, Koudougou

14.0018, COMPARISON OF THE DEVELOPMENT OF THE STANDARD VARIETIES OF GROUNDNUTS AND OF EARLY HYBRID VARIETIES

P. GILLIER, (UV.062.0001)

Objective: To obtain better knowledge of the biological differences due to hybridation and their influence on nutrition and yield.

Approach: Uprooting and daily study of 10 plants chosen at random in two plots, the one in KH 149 A, the other in Saria 90.

Results: In progress. Some differences exist in the rhythm of growth, the range of the flowering season, reactions to precipitation and to drought.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0019, BEHAVIOUR OF GROUNDNUTS ROTATED WITH SOYA AND SESAME ON THE VIRGIN SOILS OF THE VALLEY OF THE VOLTAS

P. GILLIER, (UV.062.0002)

Objective: A vast zone of vertisols which is shortly to be improved by bringing in foreign populations; to assess the possibilities of adaptation and of production of oleaginous plants, the cultivation of which is envisaged. To adapt fertilizer formulations to these new soils.

Approach: Comparative experiments and studies of behaviour in three envisaged perimeter localities. (Bases at Manga, Bitou and Diebougou),

Results: Experiments in progress.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0020, ADAPTATION TO THE NORTH OF UPPER-VOLTA OF VARIETIES OF GROUNDNUTS THAT CAN BE SUITABLE FOR SALE AS SHELLED - DELIMITED WEIGHT

P. GILLIER, (UV.062.0003)

Objective: To develop in this region a production of groundnuts fit for sale as "eating quality", more remunerative for the producer.

Approach: Comparative experiments with I.R.H.O. selected varieties originating from Congo-Brazzaville.

Results: The yields obtained with these varieties during the last two years are obviously equivalent to those with the popularized variety, at the present moment the best red seed of good quality.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0021, CULTIVATION TECHNIQUES FOR SESAME

P. GILLIER, (UV.062.0004)

Objective: To reduce the number of working days on sesame by simplification on the tasks and eliminating thinning of the seedlings.

Approach: Mixture of the seeds and fertilizer, sowing the mixture in rows. No thinning - sowing on a large scale with the manure distributor in the same conditions - various other methods.

Results: Reduction of the working days by 30 to 50 days. Yields equivalent or superior to those obtained with the customary techniques. Favourable activity of a fertilizer immediately available to the plant, which is not the case with side-dressing.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0022, CONTROL OF STUNTING OF THE GROUNDNUT PLANT - CLUMP

G. GERMANI, (UV.062.0005)

Objective: To verify that a nematocidal preparation prevents the appearance of clump.

Approach: Treatment with Nemagon (50 to 60 litres/ha.) of each 40 square cm. in comparison with a non-treated control.

Results: Very positive, no affected plant on treated plots. Influence on the yield.

SUPPORTED BY Inst. de Rech. Huiles et Olea. - France

14.0023, GROUNDNUTS ADAPTED TO THE ALTITUDE ZONE OF 900 - 1100 MM OF ANNUAL RAINFALL

P. GILLIER, (UV.062.0006)

Objective: To determine the cycle that is the best adapted as a function of the climatic conditions and of the working calendar.

Approach: Comparison of early and of semi-late groundnuts sown at different times.

Results: It appears, subject to reserve for verification, that the short cycle may be the best adapted, the semi-late (varieties) having to be sown early, and running the risk of being ready for harvesting at the same time as the sorghums.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0024, IMPROVEMENT OF THE PRODUCTIVITY OF EARLY GROUNDNUTS

P. GILLIER, (UV.062.0007)

Objective: To obtain varieties with a short cycle, well adapted to the North of Upper-Volta and of high productivity.

Approach: Inter-crossing of 8 varieties of groundnuts of different origins adpated to Upper-Volta.

Results: Research in progress - Studies of progeny.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

14.0025, RESEARCH ON EARLY VARIETIES OF GROUNDNUTS RESISTANT TO ROSETTE

P. GILLIER, (UV.062.0008)

Objective: "Rosette" severely reduces the propagation of non-resistant groundnut varieties having a short cycle, which are the best adapted to the North zone. Resistant varieties will enable this propagation, which is decidedly in the interests of the zone.

Approach: Crossing of susceptible early varieties with resistant late ones. Comparative testing of varieties - Multilocal experiments.

Results: Resistant early cultivars having high productivity and a plentiful oil content.

SUPPORTED BY Inst. de Rech. Cot. et Text. - France

STATION D'HYDRAULIQUE AGRICOLE DE MOGTEDO IRAT

Mogtedo par Zorgho

14.0026, STUDY OF THE TOXICITIES OF THE SOILS USED FOR CONTINUOUS AQUATIC CULTIVATION OF RICE

C. POISSON, (UV.023.0001)

National network project - see UV.022.0017. (14.0060)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

STATION DE RECHERCHES AGRONOMIQUES DE SARIA IRAT

Saria par Koudougou

14.0027, EXPERIMENT WITH TRIAZINE HERBICIDES ON SORGHUM

UNKNOWN, (UV.021.0001)

Objective: The future mechanization of sorghum in connection with a programme for shortening the stems necessitates the displacement of the equilibrium of the flora in favour of this new cultivated plant, which will then no longer possess advantages of natural selection. Experiments are being carried out at the Station at Saria to determine preparations for "pre-sowing" or "at-sowing" application which will ensure the maximum destruction of weeds without harming the plant.

Approach: The preparations tested since 1971 are Chlorothiazines, Methylthiotriazines, alone or as a mixture, either with or without addition of Paraquat or Alachlor. In 1972, the residual effect of these preparations was observed, on four crops: cotton, vigna, arachis, millet. Taking the 1971 results into account, the most interesting preparations were tested in a Fisher block arrangement to determine the minimal dosage ensuring a sufficient destruction of weeds without affecting the yield of the crop.

Results: The Chlorotriazines have a better herbicidal efficacy than the Methylthiotriazines in almost every case. The mixture Atrazine 1 kg plus Alachlor 0.9 kg gives the best answer to the problem. Field trials remain to be carried out on a large plot.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0028, RESEARCH FOR SHORT-CYCLE VARIETIES OF RICE ADAPTED TO CULTIVATION ON MARSHY LAND AND RESISTANT TO PIRICULARIOSIS

C. POISSON, (UV.021.0002)

Objective: To recommend a range of varieties for marginal marshy lands according to the duration of their inundation.

Approach: Collection of introduced varieties. Test of varietal behaviour in numerous low-lying marginal soils with piezometers for study of the fluctuation of the water level.

Results: Varieties to be recommended: 1) for low-lying land with only slight inundation or premature drying out: Sintane Diofor; 2) for longer inundation: C74 (with end-of-cycle nutrition by the groundwater table); 3) for very long duration of inundation: Gambiaka.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0029, IMPROVEMENT OF THE LOCAL SMALL MILLET BY PRODUCTION OF SYNTHETIC VARIETIES

C. ROBLEDO, (UV.021.0003)

Objective: To increase the productivity of the local material by utilizing the heterosis contained in a synthetic variety without making new sowings of it each year. Research on resistance to Sclerospora and to lodging.

Method: Genealogical selection in various ecotypes obtained from survey material. Starting from the S5, the best lines are tested for general aptitude for combination (2 years of testing); the lines with the best aptitude for combination are recombined as synthetic varieties.

Current Results: "SARIA synthetic variety 70". Tolerant to Sclerospora. Twenty-five percent improvement on the control.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

UPPER VOLTA

14.0030, IMPROVEMENT OF THE SEMI-LATE SORGHUMS BY HYBRIDATION BETWEEN LOCAL MATERIAL AND FOREIGN MATERIAL

C. ROBLEDO, (UV.021.0004)

Objective: Research for semi-late varieties for the zone with an annual rainfall of 700 to 900 mm. Facultative photosensitivity - Improvement of the straw/seed ratio by reduction of the height of the stems: 1.5 metres to 2.5 m. Productivity superior to that of the local varieties and grain fairly translucent.

Approach: Crossing between an American stock with short straw and high productivity (CK 60) and various local parents with giant straw of "guineensis" type with glassy grain; back-cross on the F2, then genealogical selection, experimental work and fixation of the best semi- or three-quarter local lines.

Results: A) Three semi-local lines, H34 - H37 - 182-3; Height - 1.70 m; Productivity equal to that of the local material, seed translucent enough. B) Two three-quarter local lines, 135-2 and 135-3; Heights - 2.50 and 2 m. Productivity equal to that of the local material, seed glassy enough.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0031, PRODUCTION OF A SORGHUM COMPOSITE WITH WIDE VARIABILITY BY UTILIZING THE GENETIC MALE STERILITY

C. ROBLEDO, (UV.021.0005)

Objective: To broaden the genetic base of a material and provoke recombinations before commencing selection.

Method: Recombination of 40 varieties of very diverse origins and types on a genetic sterile-male strain originating from Nigeria, in an isolated plot and harvesting sterile male individuals only.

Results: 2nd recombination cycle in dry season - 1972-73.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0032, SHORTENING THE STRAW OF A LOCAL VARIETY OF SORGHUM BY PROVOKING MUTATIONS

C. ROBLEDO, (UV.021.0006)

Objective: Improvement of the straw/grain ratio of the S.29 variety.

Method: First irradiation of S.29 in 1964 (X-rays 20,000 R). In T2, marking of the shortest plants and continuation of genealogical selection; in T6, bulk of the five best lines. Second irradiation of the bulk in 1970 (Co60 - 20,000 R) same process.

Results: Shortening of 0.80 m in the spring of the 1st irradiation. Productivity unchanged. T4 of the second irradiation in 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0033, SHORTENING OF THE STRAW OF THE LOCAL MATERIAL - SMALL MILLET

C. ROBLEDO, (UV.021.0007)

Objective: To improve the grain/straw ratio by reducing the height of the stems.

Methods: Crossing of the local material in the form of lines tolerant to Sclerospora, by a foreign sire possessing the d2 gene (strain provided by Burton) then back-crossing by the local material, because the semi-local descendants are poorly adapted.

Results: Heads of three-quarter local lines, F2 in 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0034, IMPROVEMENT OF LOCAL SMALL MILLET BY RECURRENT SELECTION

C. ROBLEDO, (UV.021.0008)

Objective: Research for genes of resistance to Sclerospora and lodging on the traditional local varieties - Elimination of "chibras" on the early varieties.

Approach: Cumulative selection with test on S1.

Results to date: 1st cycle of selection on varieties Dori Millet, Zalla, Sirakoro Millet, M.9. Test on S1 generation in winter season 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0035, IMPORTATION OF FOREIGN LATE AND SEMI-LATE SMALL MILLETS

C. ROBLEDO, (UV.021.0009)

Objective: Research for varieties whose cycle may be adapted to the zones of 600 to 800 mm and of 900 to 1,300 mm of annual rainfall and which may be more productive than the local controls. Verification of the photosensitivity on the late material.

Approach: Multilocal experimental work on introductions in the framework of I.R.A.T. co-operative experiments.

Results to date: 2 varieties from Mali. M9 semi-late, Sirakoro Millet, late.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0036, IMPORTATION OF SEMI-LATE AND LATE SORGHUMS IN DISJUNCTION

C. ROBLEDO, (UV.021.0010)

Objectives: Project for improvement by hybridation between lines selected from local and foreign material.

Approach: Introduction of material in disjunction or on the way to fixation (F2 to F5) supplied from Senegal or from Niger. Continuance of the selection up to fixation and experimental work on the best lines.

Results: Selection in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0037, FABRICATION OF EXPERIMENTAL F1 HYBRIDS OF SORGHUM

C. ROBLEDO, (UV.021.0011)

Objective: To increase the productivity of the semi and three-quarter local lines with short straw by making use of heterosis.

Approach: Creation or introduction of cytogenetic sterile-male lines. Test of these lines in form B (maintainers of the sterility). Crossing of the best lines in form A by materials of different origins which restore the fertility. Experimental work on the hybrids obtained (test of specific aptitude for combination).

Results: Two semi-local sterile-male lines suitable for seed production. First tests for aptitude in 1973.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0038, IMPROVEMENT OF SEMI-LATE AND LATE SORGHUMS BY HYBRIDATION BETWEEN LINES DESCENDED FROM SELECTION, AND FOREIGN MATERIAL

C. ROBLEDO, (UV.021.0012)

Objective: Research for semi-late and late varieties that are imperatively photosensitive (ripening at the same period irrespective of the date of sowing, to avoid either the scalding or mouldiness of the grain), for the zones of 700 to 900 mm (Saria) and 900 to 1300 mm of annual rainfall (Farako'Ba). Improvement of the

grain/straw ratio - Height of stem: 1.50 m to 2 m for the semi-late; 2 m to 2.5 m for the late varieties. Research on the tolerance to diseases of the leaves (Ramulispora, scald) and of the productivity while conserving a good quality of grain.

Approach: Crossings between semi- and three-quarter local lines and foreign late stock of different botanical types (durra, Caffra, etc.), with large grain and large panicle. Selection (genealogical) and repartition of lines into semi-late and late. Experimental work and fixation of the best lines.

Results: Cultivation of the F2 generation of these crossings in the 1973 rain-season.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

STATION FORESTIERE DE DINDERESSO CTFT

B.P. 303, Ouagadougou

14.0039, EXPERIMENT FOR (SELECTION BY) ELIMINATION OF SPECIES OF EUCALYPTUS

J.P. GALABERT, (UV.092.0001)

OBJECTIVE: To select species of Eucalyptus in the Sondano - Guinean zone.

APPROACHES: Behaviour experiment: on Eucalyptus camaldulensis, E. tereticornis, E. citriodora, different Eucalyptus spp. Experiments as statistical arrangements.

RESULTS: Eucalyptus citriodora is the species giving the best forms.

SUPPORTED BY Centre Tech. For. Trop. - Upper Volta

14.0040, EXPERIMENT ON SOURCES OF TEAK

J.P. GALABERT, (UV.092.0002)

OBJECTIVE: To test teak of various origins in the south-western region of Upper Volta.

APPROACH: Plantation of Teak from 10 origins (July, 1970). Sources of origin - India 3, Ivory Coast 3, Senegal 2, Dahomey 2. Statistical experiment with 5 repetitions.

RESULTS: In the first two years, superiority of the African origins, principally the 3 of Ivory Coast origin. Average height of the Teak trees at end of December, 1972: 7 metres.

SUPPORTED BY Centre Tech. For. Trop. - Upper Volta

STATION FORESTIERE DE LINOGHIN CTFT

B.P. 303, Ouagadougou

14.0041, STUDY OF RIVULET FORMATION AND OF EROSION ON VERTIC SOIL

J.P. GALABERT, (UV.091.0001)

OBJECTIVE: Study of rivulet formation and of erosion as a function of the modes of cultivation - quantitative and qualitative study.

APPROACH: A complete DRS Station with a pluviograph - pluviometer (rain gauge) - erosion vats - limnigraphs: 1) 3 plots to be installed, each having a minimum surface area of 1/2 hectare - of which one is a control plot - 2 plots to be managed; 2) 1 Wischmeier plot for the study of the phenomena of rivulet formation and of erosion of bare soil; 3) Control plot cultivated manually in the traditional manner; 4) Managed plots worked with an agricultural tractor.

RESULTS: Station in the course of installation.

SUPPORTED BY Centre Tech. For. Trop. - Upper Volta

14.0042, INTRODUCTION OF SPECIES OF RAPID GROWTH ON BROWN VERTIC SOIL

J.P. GALABERT, (UV.091.0002)

OBJECTIVE: Introduction of species of rapid growth on brown vertic soil.

APPROACH: Experiments on tillage. Elimination experiments. Density experiments. Study of production. Installation of experiments with statistical arrangements.

RESULTS: Station in the course of installation.

SUPPORTED BY Centre Tech. For. Trop. - Upper Volta

STATION IEMVT DE BOBO-DIOULASSO

B.P. 286, Bobo - Dioulasso

14.0043, BIOLOGICAL CONTROL OF GLOSSINA SPECIES

C. MICHEL, (UV.201.0001)

Objective: To establish methods for release, in nature, of male tsetse flies previously sterilized by gamma rays emitted by a cesium "bomb".

Result: Just starting researches.

SUPPORTED BY Inst. d' Elevage Med. Veterinaire - France

STATION IRAT DE FARAKO BA

B.P. 32, Bobo - Dioulasso

14.0044, MAPS OF SUITABLE CROPPING SITES FOR PLUVIAL RICE CULTIVATION

C. POISSON, (UV.022.0001)

Objectives: Definition of the possible sites for pluvial rice-fields and cultivation calendars.

Approach: Frequential analysis of the rains, utilization of pedological maps, regular study of the ground water-table.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0045, IMPROVEMENT OF AQUATIC RICE BY MUTAGENESIS

C. POISSON, (UV.022.0002)

Objectives: Resistance to diseases, notably to piriculariosis and to parasites (stem borers and nematodes).

Approach: Slow irradiation with cobalt-60 Gamma rays at a dose of 35 R (equals kilo Rontgen) (station for the improvement

of plants at Montpellier - France). Screening in the field (Kou valley).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0046, IMPROVEMENT OF THE LOCAL VARIETIES OF MAIZE BY PRODUCTION OF SYNTHETIC VARIETIES

C. ROBLEDO, (UV.022.0003)

Objectives: To increase the productivity of the local material by taking advantage of the heterosis contained in a synthetic variety, from which benefit may be obtained several years in succession without having to make fresh sowings.

Approach: Genealogical selection on the vigorous growth in various ecotypes descended from survey material and some introductions from South America. Starting from the S6 generation, the best lines are tested for general aptitude for combination (2 years in succession). The lines showing the best aptitude are recombined as synthetic varieties.

Results: One yellow synthetic variety, one white synthetic variety in the course of being tested.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0047, IMPROVEMENT OF THE LOCAL MATERIAL BY CUMULATIVE SELECTION - MAIZE

C. ROBLEDO, (UV.022.0004)

Objective: Research for the resistance to rust, to lodging to leaf-scald on the local Massayomba variety.

Approach: Recurrent selection with test on S1 generation.

Results: 1st cycle of selection completed.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0048, IMPROVEMENT OF THE LOCAL VARIETIES OF MAIZE BY HYBRIDATION WITH FOREIGN MATERIAL .

C. ROBLEDO, (UV.022.0005)

Objective: To increase the productivity of the local material.

Approach: Tests of specific aptitude for combination between the local white-seed variety (Massayomba) and different varieties originating from Mexico and from Kenya.

Results: Tests in progress.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0049, PRODUCTION OF A LOCAL COMPOSITE OF MAIZE WITH BROADENED GENETIC VARIABILITY

C. ROBLEDO, (UV.022.0006)

Objective: To broaden the genetic basis of the local material and to provoke favourable recombinations before commencing any selection and thus to create a working material which can be of value in different operations of selection.

Approach: Recombination of 8 varieties from the south of Mali and 8 varieties from the southwest of Upper Volta in 2 or 3 cycles. This composite will afterwards be improved by selection and recombination of lines that are vigorous and resistant to diseases (rust, scald) and to lodging. It will then be tested for its aptitude for combination with different foreign strains.

Results: First cycle of recombination in dry season 1972-73.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0050, INTRODUCTION OF FOREIGN VARIETIES OF MAIZE

C. ROBLEDO, (UV.022.0007)

Objective: Research for varieties with a long cycle (110 days), resistant to rust and to being beaten down.

Approach: Introduction and experimental work on material originating from various countries in West Africa and from Central America in the framework of co-operative work (IRAT - STRC).

Results: Composite NCB, (Nigeria); composite CDB, (Ivory Coast); hybrid x B 101, (Mexico).

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0051, THE OBTAINING OF A PRODUCTIVE HERD FOR BREEDING DRAUGHT OXEN

M. MALCOIFFE, (UV.022.0008)

Objective: The Volta peasant farmer has at his disposal a draught effort inferior to the draught effort necessary for the correct execution of work with tillage. Bearing in mind the conditions of the soil and of the material available, this traction work cannot be provided except by animals whose minimal weight is around 500 kg. The experiment consists in carrying out crossbreeding between the local breed, light-weight and tolerant of the trypanosome, and Azaouak zebu (West African Shorthorned Zebu) sires, heavier but susceptible. The object is to obtain a herd that can ensure a regular production of draught oxen of 500 kg, tolerant to this trypanosomiasis.

Approach: The first part of the experiment consisted in obtaining a group of 30 cows descended from a single bull for each of the two IRAT Stations. Tuberculosis which manifested itself at Saria, has led to the elimination of this herd in 1970. The Farako' Ba group after the successive introduction of two Azaouak bulls should provide three- fourth Azaouak x one-fourth local cattle. The weight gain and the productivity are the two selection criteria utilized.

Results: At end of 1973, the cross of 30 females, one-half Azaouak x one-half local will be attained. The herd at present possesses some ten youngstock three-fourth Azaouak x one-fourth local. There seems reason for hope that these two successive crossings carried out in the very environment where trypanosomiasis is endemic will provide tolerant animals; if not, a new crossing will have to be carried out with a tolerant (Bouake N' Dama) bull.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0052, INTEGRATION OF FORAGE CROPS INTO AN INTENSIVE ROTATION SYSTEM

M. DARONDELDEHAYES, (UV.022.0009)

Objectives: There is no integration of agriculture and animal breeding. In a first project entitled "improvement of draught oxen", I.R.A.T. is attempting to introduce one or two pairs of oxen for each concern to carry out the tillage.

This second project seeks to integrate forage crops into the cultivation system. They will provide a sufficient nutrition for these improved animals and in the same way they will share in the regeneration of the soils.

Approach: Two forage plants are being studied: Brachiaria ruziziensis and Stylosanthes gracilis. Since 1966 they have been included in a series of comparative rotation experiments, and in another series to demonstrate the effect of the regeneration of soils. Cotton, arachis and sorghum figure in the rotation. Finally in 1972 Brachiaria has been placed in comparative experiments on precedents of cropping.

Results: Brachiaria is an exacting plant which takes much from the soil but which yields a good forage. Stylosanthes is a leguminous plant which has set an excellent cropping precedent, while in addition to its rampant growth, limits erosion by good soil coverage. The exploitation of this plant presents some problems difficult to solve with the implements presently available to the grower (mowing, ploughing of the residues). A rational exploitation is difficult under these conditions.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0053, CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES

M. DARONDELDEHAYES, (UV.022.0010)

Objective: To establish lines resistant to Ps. solanacearum of fresh eating tomatoes, starting from the study of the genealogical descendants of different crossings.

Approach: Crossings are made between lines of tomatoes resistant to Ps. solanacearum, but of insufficient productivity or of mediocre quality, and conventional varieties having good commercial qualities but susceptible to the bacterium. 4 crossings have been under study since the 1967 - 68 dry season: 199 x Floralou; one hybrid Vilmoria; and 2 hybrids produced at Farako' Ba between no. F8 of the local population, and the Piernita variety.

Results: The best results are obtained with 199 x Floralou of which 6 lines are at present the object of a study in the F5 generation. The crossings of population no. 8 with Piernita are encouraging. The hybrid Vilmorin seems to be more susceptible. Necessity for pushing ahead with the selection, and particularly producing resistant lines as industrial tomatoes.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0054, CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES (2)

M. DARONDELDEHAYES, (UV.022.0011)

Objective: To search for lines resistant to Ps. solanacearum in a local material and an introduction from Ceylon.

Approach: The population cultivated locally, most frequently in marshy lands, is resistant to drought and relatively tolerant to Ps. solanacearum but it produces deformed, necrosed and acid fruits unsuitable for the market. A study of the descendants of this material has been undertaken in the course of the 1968-69 dry season.

An introduction from Ceylon, "State College 8" has been confirmed to be resistant to Pseudomonas in the Soudanian zone, but it is not very productive, having small cracked fruits. The self-selfed progeny of this introduction has been followed since the 1967-68 dry season.

Results: 10 lines from no. 78 of the local population, 5 with elongated fruits, 5 with round fruits, now in the S5 generation, have only a slight susceptibility to Pseudomonas solanacearum.

7 lines from the "State College 8", perfectly free from Ps. solanacearum, as shown in the S4 generation of their continued selection; the best will serve as sires for resistance to Pseudomonas for new crossings. In these lines an appreciable improvement in the quality of the fruits and in productivity is noted.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0055, IMPROVEMENT OF LOCAL SMALL MILLET BY RECURRENT SELECTION

C. ROBLEDO, (UV.022.0012)

National network project - see UV.021.0008. (14.0034)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0056, IMPORTATION OF FOREIGN LATE AND SEMI-LATE SMALL MILLETS

C. ROBLEDO, (UV.022.0013)

National network project - see UV.021.0009. (14.0035)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0057, IMPORTATION OF SEMI-LATE AND LATE SORGHUMS IN DISJUNCTION

C. ROBLEDO, (UV.022.0014)

National network project - see UV.021.0010. (14.0036)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0058, FABRICATION OF EXPERIMENTAL F1 HYBRIDS OF SORGHUM

C. ROBLEDO, (UV.022.0015)

National network project - see UV.021.0011. (14.0037)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0059, IMPROVEMENT OF SEMI-LATE AND LATE SORGHUMS BY HYBRIDATION BETWEEN LINES DESCENDED FROM SELECTION, AND FOREIGN MATERIAL

C. ROBLEDO, (UV.022.0016)

National network project - see UV.021.0012. (14.0038)

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0060, STUDY OF THE TOXICITIES OF THE SOILS USED FOR CONTINUOUS AQUATIC CULTIVATION OF RICE

C. POISSON, (UV.022.0017)

Objectives: Determination of the toxicity factors and definition of preventive methods.

Approach: Observation of the root profiles, analyses of soils and of plants, influence of the systems of cultivation.

National Network Project - See UV.023.0001.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0061, NITROGENOUS FERTILIZATION FOR AQUATIC RICE

C. POISSON, (UV.022.0018)

Objectives: Research on the optimal response to nitrogenous fertilization.

Approach: Fractionation of the nitrogenous nutrition of the plant from sprouting to maturity. Interaction between rate of application and fractionated application.

Results: The fractionation of the nitrogen is significant. 3 periods for fertilizer distribution advised: sprouting, mid-growth, and heading of the grain.

National Network Project - See UV.024.0001.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0062, VARIETAL IMPROVEMENT OF AQUATIC RICE BY INTRODUCTION

C. POISSON, (UV.022.0019)

Objectives: Great productivity, qualities of the grain.

Approach: Collection for observation of varieties and of lines in disjunction, tests of behaviour, organoleptic tests.

Results: 4 varieties are now being retained for their productivity and their qualities superior to those of the control. Early

series: control: Sintane, varieties L x 4-5, H7. Semi-late series: control: variety:- IR305 (?). Late series: control: Gambiaka, variety:- Sosson.

National Network Project - See UV.024.0002.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0063, RESEARCH FOR VARIETIES OF PLUVIAL RICE WITH A SHORT CYCLE, RESISTANT TO PIRICULARIOSIS, BY INTRODUCTION

C. POISSON, (UV.022.0020)

Objective: Adaptation of the cycle to the rainy-season.

Approach: Collection of introduced varieties and lines in disjunction.

Results: The introduction of Brazilian varieties has enabled the selection of 2 varieties that can be popularized: Dourado Early, IAC 25/64.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0064, INTRODUCTION OF PLUVIAL RICE INTO THE CROPPING SYSTEM

C. POISSON, (UV.022.0021)

Objectives: To define the place of pluvial rice in the rotation.

Approach: Study of the preceding crops, residual effect of manurings, study of the time taken for jobs.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

14.0065, DETERMINATION OF THE APPROPRIATE TECHNIQUES FOR CULTIVAION OF PLUVIAL RICE

C. POISSON, (UV.022.0022)

Objectives: To study the advantage of the preparation of the soil, form of plough and date for ploughing, preparation of the seed bed.

SUPPORTED BY Inst. de Rech. Agron. Trop. - Upper Volta

STATION IRCT DE BOBO-DIOULASSO

B.P. 237, Bobo - Dioulasso

14.0066, VARIETAL EXPERIMENTS WITH COTTON

H.H. CORRE, (UV.041.0001)

Objective: Varietal test with the object of choosing the variety best adapted for large-scale cultivation.

Approach: 6 experiments with 4 varieties - 3 experiments with 5 varieties - 1 experiment with 6 varieties - Fisher blocks - 3 rows per plot - 4 with 8 varieties - mineral manuring - insecticide protection.

Results: Propagation of varieties BJA 592 and 444-2.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0067, RESEARCH ON MINERAL DEFICIENCY IN COTTON

H.H. CORRE, (UV.041.0002)

Objective: To provide guidance on mineral fertilization.

Approach: 7 witholding experiments (N S P K) on cotton - Fisher blocks, component plots with 4 rows.

Results: Nitrogen and phosphorus are still the two principal deficiencies. Deficiency in sulphur is easily corrected. There is the risk of potassium becoming a limiting element.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0068, EXPERIMENTS ON SYSTEMS OF CULTIVATION AND FERTILIZATION

H.H. CORRE, (UV.041.0003)

Objective: To determine the best systems of cultivation based on cotton and on food crops. To follow the evolution of fertility.

Approach: 1 experiment on septennial rotation at Farako Ba - 3 experiments on triennial rotation - evoluton of the yields of cotton and of food crops - influence of fallow.

Results: On leached ferralytic soils, a potassic fertilizer as a complement to the N-P fertilizer would appear to be of interest.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0069, TESTS OF FORMULATIONS OF FERTILIZERS ON COTTON

H.H. CORRE, (UV.041.0004)

Objective: To test the formulations of fertilizers indicated by the mineral deficiencies project in order to advise planters on the use of fertilizers.

Approach: 4 experiments comprising the popularized fertilizer (70 kg of ammonium phosphate and 30 kg of ammonium sulphate) in 3 more elaborate fomulations- Fisher blocks - component plot with 4 rows.

Results: The more complete and the more elaborate formulations lead to the most beneficial effects and are the most profitable.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0070, COMBINED EXPERIMENT - METHOD OF PLOUGHING - FERTILIZATION

H.H. CORRE, (UV.041.0005)

Objective: To study on a rotation of maize - cotton - sorghum - arachis - the influence of three working methods (manual, team, mechanical) and of two fertilizations.

Approach: An experiment on one hectare (9 plots) per year. Foliar analyses at the level of the component plot.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0071, STUDY OF NITROGENOUS NUTRITION ON COTTON

H.H. CORRE, (UV.041.0006)

Objective: To define the critical period for nitrogenous nutrition in the course of the development of the cotton plant.

Approach: 1 experiment with basic S,P,K (sulphur, phosphorus, potassium) fertilization and fractionated application of nitrogen.

Results: No exact conclusion after one year of experiment.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0072, FOLIAR ANALYSES ON THE COTTON PLANT

H.H. CORRE, (UV.041.0007)

Objective: To adjust the methods of sampling, then to examine whether the results of the foliar analyses can be used for the detection of deficiencies.

Approach: Comparison of results drawn from field experiments (withholding experiments) with results drawn from foliar analyses.

Results: Very encouraging - they show that N and P are the two limiting factors - that sulphur should be applied in limited quantity - that potassium and boron are to be incorporated in the fertilizer.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0073, STUDY OF THE RESIDUAL ACTIVITIES OF MINERAL FERTILIZERS
H.H. CORRE, (UV.041.0008)

Objective: To test the residual activity of the mineral fertilizer applied to cotton, on the crops following in the rotation.

Approach: Comparative experiments on food plants (maize, arachis, sorghum) following the experiments on mineral fertilizers for cotton.

Results: Variable according to the experiments.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0074, LEVEL OF PHYTOSANITARY PROTECTION ON COTTON
H.H. CORRE, (UV.041.0010)

Objective: To determine the profitability of phytosanitary protection. To ascertain the efficacy of the standard treatment in relation to an enhanced treatment.

Approach: Comparative experiments with 3 levels of protection: control (very light protection) - standard protection (5-7 treatments) - enhanced treatment (11-12 treatments).

Results: The standard treatment appears to be the most profitable.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0075, TRIALS OF INSECTICIDE PREPARATIONS ON THE COTTON PLANT
H.H. CORRE, (UV.041.0011)

Objective: To study the efficiency of new preparations in relation to the classical preparations.

Approach: 1 comparative trial - 4 preparations.

Results: The popularized mixture endrin-DDT is very suitable but it could be replaced by a mixture of DDT-endosulfan-methyl-parathion. Monocrotophos might be used as an additional preparation against Argyroploce.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0076, VARIETAL EXPERIMENTS ON HIBISCUS
H.H. CORRE, (UV.041.0013)

Objective: To determine the varieties best adapted to cultivation.

Approach: Comparative experiment with repetitions, 4 varieties.

Results: Require confirmation.

Network Project: See project UV.042.0013.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0077, VIRESCENCE (A DISEASE) OF THE COTTON PLANT
H.H. CORRE, (UV.041.0014)

Objective: To determine the economic importance of the disease, to find the vector, the nature of the disease, the control methods.

Approach: Observations in all the experimental fields, collection of insects suspected of being vectors, transmission of the disease, regional inquiries.

Results: Determination of at least one of the vectors (Orosius). Identification of the Mycoplasma organism (causing the disease).

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

STATION IRCT DE OUAGADOUGOU

B.P. 574, Ouagadougou

14.0078, VARIETAL EXPERIMENTS WITH COTTON
B. HAU, (UV.042.0001)

Network project - see UV. 041.0001. (14.0066)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0079, RESEARCH ON MINERAL DEFICIENCY IN COTTON
B. HAU, (UV.042.0002)

Objective: To provide guidance on mineral fertilization.

Approach: 5 witholding experiments (N,S,P,K) on cotton - Fisher blocks, component plots with 4 rows.

Results: Very favourable efforts of nitrogen and phosphorus - potassium can be a limiting element.

Network Project: See project UV.041.0002.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0080, EXPERIMENTS - SYSTEMS OF CULTIVATION AND FERTILIZATION
B. HAU, (UV.042.0003)

Objective: To determine the best systems of cultivation based on cotton and on food crops. To follow the evolution of fertility.

Approach: 1 experiment on septennial rotation at Saria station; 4 experiments on triennial rotation; evolution of the yields of cotton and of food crops.

Results: To apply phosphorus every other year is sufficient but not minimal - the fractioning of nitrogenous fertilization is important.

Network Project: See project UV.041.0003.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0081, TESTS OF FORMULATIONS OF FERTILIZERS ON COTTON
B. HAU, (UV.042.0004)

Network project - see UV. 041.0004. (14.0069)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0082, COMBINED EXPERIMENT - METHOD OF PLOUGHING-FERTILIZATION
B. HAU, (UV.042.0005)

Network project - see UV 041.0005. (14.0070)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0083, STUDY OF NITROGENOUS NUTRITION ON COTTON
B. HAU, (UV.042.0006)

Network project - see UV. 041.0006. (14.0071)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

UPPER VOLTA

14.0084, FOLIAR ANALYSIS ON THE COTTON PLANT
B. HAU, (UV.042.0007)

Network project - see UV.041.0007. (14.0072)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0085, STUDY OF THE RESIDUAL ACTIVITIES OF MINERAL FERTILIZERS
B. HAU, (UV.042.0008)

Objective: To test the residual activity of the mineral fertilizer applied to cotton, on the crops following in the rotation.

Approach: Comparative experiments on food plants (arachis, sorghum) following the experiments on cotton.

Results: To apply phosphorus every other year is sufficient.

Network Project: See UV.041.0008.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0086, COMPARATIVE TRIAL OF CHEMICAL WEED-KILLERS IN COTTON PLANTATIONS
B. HAU, (UV.042.0009)

Ojective: To overcome in good conditions the critical period of the first month of cotton cultivation without the intervention of the farmer who is largely busy with his food crops.

Approach: 3 comparative experiments, Fisher block method, component plots of 3 rows of 25 m, 8 repetitions, test materials: Prometryne plus Ametryne - 2 kg/ha cotton plantation; Diuron - 2 kg/ha cotton plantation; Benzomarck - 2 kg/ha cotton plantation; Control, weeded (hoed); Herbicides, in solution; sprayed on between sowing and germination. The control, alone, has been hoed on the 30th day. The treated subjects have not been (hoed) until late in the second month. Evaluation is made by the production of xxxx cotton.

Result: In 2 experiments out of 3 the differences in production between the test materials are not significant at P equals 0.05. In the third experiment the production of the (plot treated with) "Prometryne plus Ametryne" and that (treated with) "Penzomarck" are superior to that of the control at P equals 0.05. Therefore, in all cases, the herbicide has fulfilled the function for which it was used. It may be considered for release for popular use if those results are confirmed.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0087, LEVEL OF PHYTOSANITARY PROECTION ON COTTON
B. HAU, (UV.042.0010)

Network prject - see UV.041.0010. (14.0074)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0088, TRIALS OF INSECTICIDE PREPARATIONS ON THE COTTON PLANT
B. HAU, (UV.042.0011)

Network project - See UV.041.0011. (14.0075)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0089, EXPERIMENT ON THE FREQUENCY OF INSECTICIDAL SPRAYING OF THE COTTON CROP
B. HAU, (UV.042.0012)

Objective: To determine the best frequency, bearing in mind the efficacy and the net cost.

Approach: Comparative experiment. Fisher block method; component plot with 8 rows of 25 m, 8 repetitions; 4 materials: 1 spraying every 5 days (14 sprayings); 1 spraying every 10 days (8 sprayings); 1 spraying every 15 days (5 sprayings); Control, untreated (0 sprayings). Insecticide preparation: Endrin-DDT (140 - 900 g. of material applied/ha/treatment.

Result: The best protection is assured by the 14 sprayings but, from the economic point of view, the best result is given by one treatment every 12 days as shown by the curve integrating the production of all the plots.

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

14.0090, VARIETAL EXPERIMENTS ON HIBISCUS
B. HAU, (UV.042.0013)

Network project - see UV.041.0013. (14.0076)

SUPPORTED BY Inst. de Rech. Cot. et Text. - Upper Volta

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GRAIN LEGUME PHYSIOLOGICAL INVESTIGATIONS ... Breeding & Genetics; Glycine Max; Seed Bank; ...**9.0167**

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LONG TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY UNDER THREE FUNDAMENTALLY DIFFERENT FARMING SYSTEMS ... Compost; Continuous Humid 7 Months,Plus; Ferric Acrisols; Manure; ...**9.0254**

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RESEARCH ON VARIETIES OF VIGNA UNGUICULATA WITH GOOD RESPONSE TO INTENSIVE TECHNICS (WATER, FERTILIZERS) ... Hot Equatorial or Hot Tropical; Soil Moisture; ...**11.0003**

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EXPERIMENT DURATION OF FALLOW ... Fallowing; Phaseolus; Sand; ...**13.0048**

FABRICATION OF EXPERIMENTAL F1 HYBRIDS OF SORGHUM ... Breeding & Genetics; Ferric Luvisols; Heterosis; Male Sterility; Sorghum Vulgare (Grain); ...**14.0058**

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INTRODUCTION OF FORAGE SHRUBS INTO AN ARID ZONE ... Cover Crops; Humid 1 Month; Luvic Arenosols; Orthic Solonetz; Vertic Cambisols; ...**14.0007**

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IMPROVEMENT OF THE COFFEE-SHRUB (C. CANEPHORA) BY GENERATIVE MEANS ... Breeding & Genetics, Spice&Bev; Ferric Acrisols; Genetics; Management; Two Humid Seasons-7 Month,Plus; Weathering Resistance; ...**4.0104**

IMPROVEMENT OF THE COFFEE-SHRUB (C.CANEPHORA) BY GENERATIVE MEANS ... Breeding & Genetics, Spice&Bev; Management; Weathering Resistance; ...**4.0123**

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COLLECTION OF VARIETIES FOR THE PLUVIAL RICEFIELDS ... Cereal Crops; Crambidae; Insect Resistance; Piricularia; Seed Bank; ...**4.0160**

SELECTION OF BEAN (COWPEA) VARIETIES WITH DESIRABLE AGRONOMIC AND ECONOMIC CHARACTERS ... Breeding & Genetics; Continuous Humid 7 Months,-Plus; Hybrid Breeding -nonspecific; ...**9.0223**

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CHEMICAL CONTROL MEASURES AGAINST PIRICULARIA ORYZAE ... Continuous Humid; Inoculation; Phytopathology; Piriculariosis; ...**4.0190**

TECHNIQUES FOR MULTIPLICATION OF THE SEEDS OF HIBISCUS SPECIES ... Fiber Crops; Herbicides -nonspecific; Seeding or Planting Rate; Timing of Planting Procedures; ... **6.0088**

DEVELOPMENT OF SEED STANDS AND SEED ORCHARDS ... Gmelina; Intraspec. Genetic Relations; Silviculture; Tectona; Variation and Selection; ... **9.0075**

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ESTABLISHMENT OF SEED ORCHARDS ... Eucalyptus; Humid 4 Months; Pinus; Silviculture; Variation and Selection; ... **9.0351**

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SUGARCANE AGRONOMY ON THE BLACK SOILS OF THE ACCRA PLAINS ... Bladex; Growth Stage of Plant; Saccharum; Simazine; Space Competition; Sulfates; ... **3.0006**

N.P.K. FACTORIALS - FERTILIZER TRIAL IN SUGARCANE ... Formulation, Fertilizer; Irrigation; Irrigation -general; Saccharum; Two Humid Seasons-7 Month,Plus; ... **3.0112**

TREATMENT OF SUGARCANE PLANTING METHOD ... Dip Application; Pesticides -other; Saccharum; Two Humid Seasons-7 Month,Plus; Water; ... **3.0113**

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TYPE OF PLANTING MATERIAL AND SPACING TRIALS IN SUGAR CANE ... Saccharum; Space Competition; Two Humid Seasons-7 Month,Plus; ... **3.0115**

CHEMICAL WEED CONTROL IN SUGARCANE ... Fenac; Grasses or Sedges; Pesticides -other; Saccharum; Sugar Crops; ... **3.0116**

SUGARCANE AGRONOMIC INVESTIGATIONS ... Continuous Humid 7 Months,Plus; Insect Resistance; Saccharum; ... **3.0154**

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EXPERIMENTAL AGRONOMIC WORK ON SUGAR-CANE (CANNA) ... Eutric Cambisols; Humid 1 Month; Saccharum; Vertic Cambisols; ... **8.0022**

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SURVEY AND ASSESSMENT OF THE SMUT AND BLAST DISEASES OF SUGARCANE ... Blast; Fungal Resistance; Saccharum; Smuts; Surveys; Ustilaginales; ... **9.0240**

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AIR CURED TOBACCO VARIETY TRIAL ... Continuous Humid 7 Months,Plus; Curing Technique; Nicotiana; ... **3.0144**

EFFECT OF TIME OF LAND PREPARATION AND PLANTING ON YIELD QUALITY OF FLUE CURED TOBACCO ... Continuous Humid 7 Months,Plus; Nicotiana; Plowing; Seedbed Preparation; Soil Tillage Methods -other; Timing of Planting Procedures; ... **3.0145**

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FIRE CURED TOBACCO VARIETY TRIAL ... Continuous Humid 7 Months,Plus; Nicotiana; ... **3.0147**

TOBACCO SUCKER CONTROL WITH CHEMICALS ... Continuous Humid 7 Months,Plus; Growth Retardation of Plants; Maleic Hydrazide; Nicotiana; Off-shoot T; ... **3.0148**

CROPS SEQUENCE TRIAL ... Disease Resistance; Fallowing; Moist Monsoon 0 to 3 Months; ... **3.0200**

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STUDIES ON PLANT PARASITIC NEMATODES ASSOCIATED WITH ECONOMIC CROPS IN GHANA ... Cocos; Mangifera; Nicotiana; Saccharum; ... **3.0127**

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Soil Structure

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Aldrin

See Pesticides

Insecticides

Aleyrodidae

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Homoptera

Allium

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Alternaria

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Aluminum
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Amaranthaceae

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Amiben
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GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

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BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ...**9.0177**

Glutamic Acid

GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

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GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

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MAIZE IMPROVEMENT THROUGH BREEDING ... Back Cross; Breeding & Genetics; Lodging; Proteins; Recurrent Selection; Tryptophane; ...**3.0161**

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TO DETERMINE THE CRUDE PROTEIN LYSINE AND TRYPTOPHAN CONTENT OF THE RECOMMENDED MAIZE VARIETIES ... Cereal Crops; Proteins; Tryptophane; ...**9.0201**

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GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

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MAIZE IMPROVEMENT THROUGH BREEDING ... Back Cross; Breeding & Genetics; Lodging; Lysine; Proteins; Recurrent Selection; ...**3.0161**

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; ...**9.0177**

TO DETERMINE THE CRUDE PROTEIN LYSINE AND TRYPTOPHAN CONTENT OF THE RECOMMENDED MAIZE VARIETIES ... Cereal Crops; Lysine; Proteins; ...**9.0201**

IMPROVEMENT OF THE PROTEIN CONTENT AND QUALITY OF THE PROTEINS OF MAIZE ... Back Cross; Breeding & Genetics; Lysine; Nutritive Values -plant; Proteins; ...**11.0015**

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Anatomy

Andropogon

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Anim. Nutrient Requirements.

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Animal Characteristics

Adaptation

Carcass Evaluation

Conformation & Uniformity

Growth Rate

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CROSSBREEDING FOR BEEF ... Disease Resistance; Maturity & Growth Stages; Trypanosomiases; ...**3.0010**

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UTILIZATION OF MOLASSES FOR RAPID FATTENING OF 4-YEAR-OLD N'DAMA CATTLE ... Carcass Evaluation; Concentrates; Cottonseed Oilmeal, Etc.; Green-chop; Panicum; Stylosanthea; ...**4.0016**

CROSSBREEDING JERSEY N'DAMA. FATTENING OF BEEF QUALITY JERSEY N'DAMA CROSSBRED CATTLE ... Carcass Evaluation; Cottonseed Oilmeal, Etc.; In Vivo--see Also Feed Rations; Manihot; Panicum; ...**4.0019**

IMPROVEMENT OF FORAGE PRODUCTION IN SAVANNAH ZONE BY MODIFICATION OF THE TRADITIONAL SYSTEM ... Broadcast Application; Costs; Dry Monsoon 4 M. or Less; Moist Monsoon; Stylosanthea; ...**4.0027**

STUDY OF THE ESTABLISHMENT OF ARTIFICIAL PASTURES OF STYLOSANTHES GRACILIS ... Carrying Capacity -pasture; Continuous Humid; Herbicides -nonspecific; Irrigation -general; Stylosanthea; ...**4.0030**

OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE ... Berenil; Muscidae; Pesticides - other; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**5.0021**

EVALUATION OF CROP RESIDUES, INDUSTRIAL WASTE PRODUCTS AND SILAGE ON THE PERFORMANCE OF BEEF CATTLE ... Bran; In Vitro Feed Studies; Rice; ...**9.0031**

UTILIZATION OF COTTON-SEED IN THE NUTRITION OF FARM ANIMALS ... By-products- Plant(Vegetative); Concentrates; Grains; In Vivo--see Also Feed Rations; Nutritive Values -plant; Processing Feeds; ...**11.0033**

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CROSSBRED JERSEY-N'DAMA. STUDY OF THE PERFORMANCE OF HALF-BREED JERSEY CATTLE ... Continuous Humid; Fats - Lipids & Oils; Growth Rate; Parasite Resistance; Reproductive Rates; Trypanosomiases; ...**4.0021**

IMPROVEMENT OF MILK PRODUCTION BY CROSSING THE LOCAL ZEBU BREED WITH IMPORTED SIRES ... Humid 1 Month; Interspecific Cross; ...**11.0001**

Management

TICK SURVEY ON SELECTED AREAS ON THE ACCRA PLAINS ... Dry Monsoon 4 to 5 Months; Ixodidae; Maturity & Growth Stages; Surveys; ...**3.0028**

OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE ... Berenil; Muscidae; Pesticides - other; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**5.0021**

PRODUCTION OF MILK AND REARING OF THE CALF ... Calf Rations, Starter Rations; ...**11.0078**

Farm Animals -other

IMPROVEMENT OF THE BOVINE HERD IN ORDER TO OBTAIN WORK OXEN ... Cattle Rations; Growth Rate; Humid 3 Months; Supplements, Feed Additives; ...**8.0032**

THE OBTAINING OF A PRODUCTIVE HERD FOR BREEDING DRAUGHT OXEN ... Ferric Luvisols; Humid 4 Months; Trypanosoma; Trypanosomiases; Tuberculosis; Veterinary Medicine; ...**14.0051**

INTEGRATION OF FORAGE CROPS INTO AN INTENSIVE ROTATION SYSTEM ... Ferric Luvisols; Management; Paniceae -other; Production and Processing; Sorghum Vulgare (Grain); ...**14.0052**

Goat Husbandry

OBSERVATIONS ON GROWTH AND PERFORMANCE ON NUBIAN GOATS ... Berenil; Muscidae; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**5.0012**

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Immunity; Rinderpest; Veterinary Medicine; ...**8.0004**

GASTRO-INTESTINAL PARASITISM IN THE RED GOAT ... Coccidia; Digestive Diseases -animal; Feces; Malnutrition; Strongyloidea; Treatment; ...**8.0006**

MICROORGANISMS IN THE RUMEN AND THEIR ROLE IN NUTRITION ... Cellulase; Cellulose; In Vivo--see Also Feed Rations; Rumen Bacteria; Taxonomy, Plant; Vertebrate Nutrition; ...**9.0025**

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pasteurella; Pneumonia; Respiratory System; ...**11.0107**

Management

THE NUTRITIVE VALUE OF NIGERIAN FORAGES ... Cellulose; In Vitro Feed Studies; Lignin; Nutritive Values -plant; Stylosanthea; ...**9.0020**

THE USE OF INDUSTRIAL BY-PRODUCTS IN SHEEP AND GOAT RATIONS ... Bran; Consumption; Food Science and Technology; In Vivo--see Also Feed Rations; Molasses; Service Industries; ...**9.0033**

Horses

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Pathology -mammal; Serology; Veterinary Medicine; ...**11.0099**

EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY ... Equine Encephalomyelitis; Etiology; Picornaviruses; Veterinary Entomology; ...**11.0100**

Pets

PASTEURELLOSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Haemorrhagic Septicaemia; Hemorrhagic; Pasteurella; Pasteurelloses; ...**11.0112**

Poultry Husbandry

POULTRY DISEASE INVESTIGATION ... Histology and Cytology; Nutrition in Disease; Poultry -nonspecific; ...**3.0001**

STUDIES OF THE GUINEA FOWL (NUMIDIA MELEAGRIS) ... Numidia; Sexing Methods; Vertebrate Nutrition; ...**3.0058**

Breeding & Genetics

GENETIC VALUE OF LOCAL CHICKENS AS MATERIAL FOR IMPROVEMENT OF POULTRY PRODUCTION ... Chicken, Domestic; Hatchability; ...**9.0022**

DISEASE RESISTANCE OF LOCAL CHICKENS ... Coccidioides; Coccidiosis; Disease Resistance; Leucosis; Veterinary Medicine; ...**9.0029**

Management

LOCAL LEAFMEAL AS SOURCES OF EGG YOLK COLOUR ... Chicken, Domestic; Egg Production; Eggs; Medicago; Processing Feeds; ...**3.0033**

LOCAL FEED INGREDIENTS IN POULTRY RATIONS ... Chicken, Domestic; Concentrates; Corn; Growth Rate; Poultry Rations; ...**3.0034**

FERMACTO 500 SUPPLEMENTATION TO LAYER DIETS ... Commercial Rations or Feeds; Fermacto; Fishmeal; In Vivo--see Also Feed Rations; Poultry Rations; Supplements, Feed Additives; ...**3.0035**

PROTEIN REQUIREMENT OF CHICKENS IN TROPICAL ENVIRONMENT - PROTEIN LEVEL FOR CHICKS ... Chicken, Domestic; Feed Proteins & Amino Acids; Poultry Rations; ...**3.0037**

THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF THE LAYING HEN ... Calcium; Chicken, Domestic; Egg Production; Inorganic Elements in Feeds; Phosphorus; Poultry Rations; ...**9.0021**

EFFECTS OF MANAGEMENT AND ENVIRONMENT ON GROWTH AND LAYING ABILITY OF IMPORTED COMMERCIAL STRAINS OF CHICKENS ... Chicken, Domestic; Farm Buildings & Shelters; Growth Rate; Litter or Bedding; ...**9.0027**

Quality of Animal Products

Eggs

LOCAL LEAFMEAL AS SOURCES OF EGG YOLK COLOUR ... Chicken, Domestic; Egg Production; Management; Medicago; Processing Feeds; ...**3.0033**

Sheep Husbandry

STUDIES WITH THE SMALL RUMINANTS ... Bovidae; Dry Monsoon 4 to 5 Months; Veterinary Medicine; ...**3.0019**

CONTROL OF PNEUMONIA-ENTERITIS COMPLEX IN GOATS BY USE OF "PEC" TISSUE VACCINE ... Blood and Lymph System; Immunity; Pneumonia; Vaccines; Veterinary Medicine; ...**9.0019**

Management

INTERCROPPING OF SHEEP UNDER PLANTATION CROPS ... Citrus; Intercropping; Mangifera; Persea; ...**3.0059**

THE NUTRITIVE VALUE OF NIGERIAN FORAGES ... Cellulose; In Vitro Feed Studies; Lignin; Nutritive Values -plant; Stylosanthea; ...**9.0020**

THE USE OF INDUSTRIAL BY-PRODUCTS IN SHEEP AND GOAT RATIONS ... Bran; Consumption; Food Science and Technology; In Vivo--see Also Feed Rations; Molasses; Service Industries; ...**9.0033**

Swine Husbandry

Breeding & Genetics

SWINE BREEDING ... Growth Rate; ...**5.0011**

THE PRODUCTIVE POTENTIAL OF LOCAL BREEDS OF PIGS IN THE WESTERN STATE OF NIGERIA ... Management; ...**9.0032**

Management

NUTRITIONAL STUDIES WITH PIGS USING DIETS CONTAINING MAINLY LOCALLY PRODUCED FEED STUFFS ... Dry Monsoon 4 to 5 Months; Swine Rations; Vertebrate Nutrition; ...**3.0015**

HELMINTH PARASITES OF PIGS IN GHANA ... Population Dynamics; Taenia; ...**3.0029**

THE EFFECT OF LEVEL OF WHEAT BRAN ON NUTRIENT METABOLISM BY PIGS ... Bran; Fishmeal; Vertebrate Nutrition; Wheat; ...**3.0030**

THE COMPARATIVE PERFORMANCE OF PIGS FED DIETS CONTAINING DIFFERENT LEVELS OF WHEAT BRAN ... Bran; Carcass Evaluation; Fishmeal; Swine Rations; Wheat; ...**3.0031**

STUDIES ON IRON SUPPLEMENT FOR PIGLETS ... Growth Rate; Inorganic Elements in Feeds; Iron; Mineral Blocks, Salt Blocks; Supplements, Feed Additives; Vitamins; ...**3.0032**

THE USE OF DISCARDED COCOA BEAN MEAL IN LIVESTOCK FEEDING ... By-products- Plant(Vegetative); In Vivo--see Also Feed Rations; Nutritive Values -plant; Proteins; ...**9.0030**

THE PRODUCTIVE POTENTIAL OF LOCAL BREEDS OF PIGS IN THE WESTERN STATE OF NIGERIA ... Breeding & Genetics; ...**9.0032**

Wildlife

Breeding & Genetics

BIOLOGY AND PHYSIOLOGY OF A SAVANNAH RODENT ... Hormones; Pregnancy; Sexual Cycle; Vagina; ...**4.0060**

STUDY THE MECHANISM OF THE GENETICS OF HYBRIDATION OF TILAPIA SPECIES ... Cichlidae; Fish Farming; ...**4.0329**

Animal Nematodes -nonspecific

See Aschelminthes

Nematoda

Animal Pathology

POULTRY DISEASE INVESTIGATION ... Histology and Cytology; Nutrition in Disease; Poultry -nonspecific; Poultry Husbandry; ...**3.0001**

LIVESTOCK DISEASE INVESTIGATION ... Histology and Cytology; ...**3.0232**

HELMINTHOSES OF FARM ANIMALS - EPIDEMIOLOGY ... Epidemiology of Disease; Pest Control Measures; Population Dynamics; Veterinary Medicine; ...**11.0090**

AVIAN DISEASES - EPIDEMIOLOGY - PROPHYLAXIS AND TREATMENT ... Birds; Diagnosis; Epidemiology of Disease; Treatment; Veterinary Medicine; ...**11.0114**

Abortion

BRUCELLOSIS - EPIDEMIOLOGICAL SURVEY ... Brucella; Brucelloses; Epidemiology of Disease; Hygromas Bursitis; ...**11.0110**

African Horse Sickness

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Pathology -mammal; Serology; Veterinary Medicine; ...**11.0099**

Anthrax

BACTERIAL VACCINES - ESTABLISHMENT - IMPROVEMENT ... Bacterial Vaccine; Bovine Pleuropneumonia; Haemorrhagic Septicaemia; Hemorrhagic; Pleuropneumonia Group; ...**11.0111**

Mycosis

STUDIES INTO SKIN DISEASES OF FARM ANIMALS ... Besnoitiosis; Demodicosis; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**3.0055**

Myocardial Edema

HEARTWATER PROPHYLAXIS - ESTABLISHMENT OF A METHOD FOR PREMUNITION OF CATTLE ... Dairy Husbandry; Prophylaxis; Veterinary Medicine; ...**11.0101**

Newcastle Disease

IMMUNE RESPONSE TO NEWCASTLE DISEASE VACCINES ... Chicken, Domestic; Evaluation, Efficacy; Globulins; Hemagglutination Inhibition; Immunity; Viral Vaccines; ... **3.0024**

AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT ... Fowl Pox; Immunity; Salmonella; Veterinary Medicine; ...**11.0115**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE ... Fowl Cholera; Fowl Typhoid Pullorum Disease; Myxoviruses, True; Poultry -nonspecific; Salmonella; Veterinary Medicine; ... **11.0117**

Pasteurelloses

PASTEURELLOSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Haemorrhagic Septicaemia; Hemorrhagic; Pasteurella; Pets; ...**11.0112**

Pneumonia

CONTROL OF PNEUMONIA-ENTERITIS COMPLEX IN GOATS BY USE OF "PEC" TISSUE VACCINE ... Blood and Lymph System; Immunity; Sheep Husbandry; Vaccines; Veterinary Medicine; ...**9.0019**

BOVINE PLEUROPNEUMONIA - ESTABLISHMENT OF A FREEZE-DRIED, HEAT-RESISTANT VACCINE ... Bacterial Vaccine; Freeze-dry Techniques; Immunity; Thiosulfates; Veterinary Medicine; ...**11.0103**

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pasteurella; Respiratory System; ... **11.0107**

Pulmonary Syndrome

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Bovidae; Etiology; Pleuropneumonia Group; Rinderpest; ...**11.0097**

Respiratory Diseases -other

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pasteurella; Pneumonia; Respiratory System; ...**11.0107**

Rinderpest

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Immunity; Veterinary Medicine; ...**8.0004**

RINDERPEST PROPHYLAXIS - SEROLOGICAL SURVEILLANCE OF IMMUNITY ... Globulins; Immunology; Pseudomyxoviruses; Serology; Veterinary Medicine; ...**11.0095**

RINDERPEST PROPHYLAXIS - ESTABLISHMENT OF A THERMO-RESISTANT VACCINE ... Immunity; Prophylaxis; Pseudomyxoviruses; Veterinary Medicine; Viral Vaccines; ... **11.0096**

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Bovidae; Etiology; Pleuropneumonia Group; Pulmonary Syndrome; ...**11.0097**

BOVINE PLEUROPNEUMONIA - ESTABLISHMENT OF A FREEZE-DRIED, HEAT-RESISTANT VACCINE ... Bacterial Vaccine; Freeze-dry Techniques; Immunity; Pneumonia; Thiosulfates; Veterinary Medicine; ...**11.0103**

Salmonelloses

SALMONELLOSIS - EPIDEMIOLOGICAL SURVEY ON HEALTHY CARRIERS ... Birds; Feces; Rodentia; ...**11.0105**

Sheep Scab or Sheep Pox

POX OF SMALL RUMINANTS - EPIDEMIOLOGICAL AND PROPHYLACTIC RESEARCH ... Epidemiology of Disease; Poxviruses; Viral Vaccines; ...**11.0098**

Skin Diseases -other

CONTROL OF SKIN DISEASES OF FARM ANIMALS ... Dry Monsoon 4 to 5 Months; Skin or Special Derivatives; Veterinary Medicine; ...**3.0017**

Streptothricosis

STUDIES INTO SKIN DISEASES OF FARM ANIMALS ... Besnoitiosis; Demodicosis; Mycosis; Skin or Special Derivatives; Veterinary Medicine; ...**3.0055**

EXPERIMENT ON FATTENING OF FULANI ZEBU CATTLE ON STYLOSANTHES PASTURE WITH OR WITHOUT A FODDER SUPPLEMENT ... Cattle Rations; Continuous Humid; Forage, Pasture or Range; Legumes; Rice; Stylosanthea; ... **4.0015**

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Immunity; Skin or Special Derivatives; Veterinary Medicine; ...**11.0113**

Strongylosis

GASTRO-INTESTINAL PARASITISM IN THE RED GOAT ... Coccidia; Digestive Diseases -animal; Feces; Malnutrition; Strongyloidea; Treatment; ...**8.0006**

Trypanosomiases

CROSSBREEDING FOR BEEF ... Breeding & Genetics; Disease Resistance; Maturity & Growth Stages; ...**3.0010**

IMMUNOLOGICAL STUDIES INTO ANIMAL TRYPANOSOMIASIS ... Muridae; Veterinary Medicine; ... **3.0056**

CROSSBREEDING JERSEY-N'DAMA. 1/4 N'DAMA ANIMALS ... Breeding & Genetics; Fats - Lipids & Oils; Parasite Resistance; ...**4.0020**

CROSSBRED JERSEY-N'DAMA. STUDY OF THE PERFORMANCE OF HALF-BREED JERSEY CATTLE ... Breeding & Genetics; Continuous Humid; Fats - Lipids & Oils; Growth Rate; Parasite Resistance; Reproductive Rates; ... **4.0021**

CROSSBRED-JERSEY N'DAMA. STUDY OF THE PERFORMANCE OF 3/8 JERSEY - 5/8 N'DAMA CATTLE ... Conformation & Uniformity; Continuous Humid; Fats - Lipids & Oils; Growth Rate; Parasite Resistance; ...**4.0022**

OBSERVATIONS ON GROWTH AND PERFORMANCE ON NUBIAN GOATS ... Berenil; Goat Husbandry; Muscidae; Veterinary Entomology; Veterinary Medicine; ...**5.0012**

OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE ... Berenil; Management; Muscidae; Pesticides -other; Veterinary Entomology; Veterinary Medicine; ...**5.0021**

CONTROL CAMPAIGN AGAINST TSETSE FLIES AND ANIMAL TRYPANOSOMIASES ... Barriers & Weirs; DDT; Muscidae; Veterinary Entomology; Veterinary Medicine; ...**8.0021**

RESISTANCE TO TRYPANOSOMIASIS IN CATTLE ("METIS DE BAMBEY") BREED ... Beef Husbandry; Parasite Resistance; Trypanosoma; Veterinary Medicine; ...**11.0037**

TRYPANOSOMIASES - IMMUNOLOGY ... Diagnosis; Epidemiology of Disease; Immunology; Trypanosoma; Veterinary Medicine; ...**11.0091**

TRYPANOSOMIASES - CONTROL CAMPAIGN AGAINST THE VECTORS ... Dieldrin; Muscidae; Surveys; Trypanosoma; Veterinary Entomology; Veterinary Medicine; ...**11.0092**

TRYPANOSOMIASES - TREATMENT ... Pesticides -other; Treatment; Trypanosoma; Veterinary Medicine; ...**11.0093**

THE OBTAINING OF A PRODUCTIVE HERD FOR BREEDING DRAUGHT OXEN ... Farm Animals -other; Ferric Luvisols; Humid 4 Months; Trypanosoma; Tuberculosis; Veterinary Medicine; ...**14.0051**

Tuberculosis

BACTERIOLOGICAL INQUIRY ON SLAUGHTERED ANIMALS ... Bacteria; Carcass Evaluation; Melioidosis; Mycobacterium Tuberculosis; Veterinary Medicine; ...**8.0005**

THE OBTAINING OF A PRODUCTIVE HERD FOR BREEDING DRAUGHT OXEN ... Farm Animals -other; Ferric Luvisols; Humid 4 Months; Trypanosoma; Trypanosomiases; Veterinary Medicine; ...**14.0051**

Vibriosis

VIBRIOSIS - EPIDEMIOLOGICAL SURVEY ... Brucelloses; Epidemiology of Disease; Globulins; Vagina; Veterinary Medicine; Vibrio Fetus; ...**11.0108**

Animal Powered Equipment

See Farm Machinery, Equip & Power

Animal Rations

See Feed Science and Technology

Animal Resistance

See Also Pest Control Measures

Resistance & Tolerance

Disease Resistance

CROSSBREEDING FOR BEEF ... Breeding & Genetics; Maturity & Growth Stages; Trypanosomiases; ...**3.0010**

DISEASE RESISTANCE OF LOCAL CHICKENS ... Breeding & Genetics; Coccidioides; Coccidiosis; Leucosis; Veterinary Medicine; ...**9.0029**

Parasite Resistance

CROSSBREEDING JERSEY-N'DAMA. 1/4 N'DAMA ANIMALS ... Breeding & Genetics; Fats - Lipids & Oils; ...**4.0020**

CROSSBRED JERSEY-N'DAMA. STUDY OF THE PERFORMANCE OF HALF-BREED JERSEY CATTLE ... Breeding & Genetics; Continuous Humid; Fats - Lipids & Oils; Growth Rate; Reproductive Rates; Trypanosomiases; ...**4.0021**

CROSSBRED-JERSEY N'DAMA. STUDY OF THE PERFORMANCE OF 3/8 JERSEY - 5/8 N'DAMA CATTLE ... Conformation & Uniformity; Continuous Humid; Fats - Lipids & Oils; Growth Rate; Trypanosomiases; ...**4.0022**

RESISTANCE TO TRYPANOSOMIASIS IN CATTLE ("METIS DE BAMBEY") BREED ... Beef Husbandry; Trypanosoma; Trypanosomiases; Veterinary Medicine; ...**11.0037**

Animal Tillage

See Soil Tillage

Annonaceae

See Plants - Dicots

Anthracnose

See Plant Diseases

Anthrax

See Animal Pathology

Anthropology

See Social Sciences

Anti-transpirants

See Pest Control Measures

Antibiotics

Penicillin

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Immunity; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**11.0113**

Streptomycin

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Immunity; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**11.0113**

Antigen

See Proteins

Antihelminth

See Pesticides

Antiprotozoal

See Pesticides

Aphididae

See Insecta

Homoptera

Apidae

See Insecta

Hymenoptera

Apocynaeae

See Plants - Dicots

Application Methods

INSECTICIDAL CONTROL OF YAM BEETLE ... Coleoptera -other; Timing of Application; Vegetables; ...**9.0262**

Aerial (Any Type of Aircraft)

INVESTIGATIONS INTO THE BIONOMICS AND CONTROL OF INSECT PESTS ON SUGAR CANE ... Crambidae; Dip Application; Isoptera; Saccharum; Toxaphene; ...**3.0135**

CONTROL CAMPAIGN AGAINST TSETSE FLIES AND ANIMAL TRYPANOSOMIASES ... Barriers & Weirs; DDT; Muscidae; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**8.0021**

Band Application

EFFECTS OF FERTILIZER PLACEMENT ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS, CANNABINUS L. ... Continuous Humid 7 Months,Plus; Management; Subsoil Application; ...**3.0137**

USE OF ISOTOPES IN STUDIES ON THE NUTRITION OF GROUNDNUTS ... Broadcast Application; Management; Nitrogen Fixation; Sulfur; ...**3.0219**

NITROGEN FERTILIZATION IN FLOODED FIELDS - METHODS AND TIMING OF NITROGEN APPLICATION ... Broadcast Application; Eutric Gleysols; Humid 6 Months; Sodium; Timing of Application -other; ...**9.0011**

PHOSPHATE PLACEMENT TRIAL ... Broadcast Application; Ferric Acrisols; Management; Rain; ...**9.0251**

Broadcast Application

EFFECTS OF FERTILIZER PLACEMENT ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS, CANNABINUS L. ... Band Application; Continuous Humid 7 Months,Plus; Management; Subsoil Application; ...**3.0137**

USE OF ISOTOPES IN STUDIES ON THE NUTRITION OF GROUNDNUTS ... Management; Nitrogen Fixation; Sulfur; ...**3.0219**

IMPROVEMENT OF FORAGE PRODUCTION IN SAVANNAH ZONE BY MODIFICATION OF THE TRADITIONAL SYSTEM ... Costs; Dry Monsoon 4 M. or Less; Moist Monsoon; Stylosanthea; ...**4.0027**

NURSERY TECHNIQUES TRIAL FOR RICE ... Humid 6 Months; Management; Nursery Observational Plots; Placement; Pregermination of Seeds; Transplanting Methods; ...**9.0007**

NITROGEN FERTILIZATION IN FLOODED FIELDS - METHODS AND TIMING OF NITROGEN APPLICATION ... Eutric Gleysols; Humid 6 Months; Sodium; Timing of Application -other; ...**9.0011**

PHOSPHATE PLACEMENT TRIAL ... Ferric Acrisols; Management; Rain; ...**9.0251**

Dip Application

TREATMENT OF SUGARCANE PLANTING METHOD ... Management; Pesticides -other; Saccharum; Two Humid Seasons-7 Month,Plus; Water; ...**3.0113**

IMPROVEMENT OF OIL PALM SEED GERMINATION ... Continuous Humid 7 Months,Plus; Germination; Management; Moisture Content -plants; ...**3.0121**

INVESTIGATIONS INTO THE BIONOMICS AND CONTROL OF INSECT PESTS ON SUGAR CANE ... Crambidae; Isoptera; Saccharum; Toxaphene; ...**3.0135**

Drill Application

IMPROVEMENT OF FORAGE PRODUCTION IN SAVANNAH ZONE BY MODIFICATION OF THE TRADITIONAL SYSTEM ... Broadcast Application; Costs; Dry Monsoon 4 M. or Less; Moist Monsoon; Stylosanthea; ...**4.0027**

STUDY OF THE PREPARATION OF THE SEED BED AND OF TEAM-CULTIVATION IMPLEMENTS FOR THE CULTIVATION OF FLOATING RICE ... Management; Non-dry 3 Months, Plus; Rotary Tillage, Rotary Hoe; Soil Preparation & Renovation; ...**6.0062**

CROPPING TECHNIQUES FOR IRRIGATED RICE ... Hot Equatorial or Hot Tropical; Management; Planting Methods -other; Pricking Out; ...**8.0001**

SEED RATE TRIAL WITH UPLAND RICE ... Continuous Humid 7 Months,Plus; Crop Production, Harvesting; Management; Seeding or Planting Rate; ...**9.0209**

Foliar Application

FIELD TRIALS ON PESTICIDES AGAINST COCOA MIRIDS ... Beverage Crops; Ferralic Arenosols; Management; Miridae; Thiodan; Two Humid Seasons; ...**4.0144**

APPLICATION OF METHODS OF CHEMICAL CONTROL AGAINST COELAENOMENDOERA ELAEIDIS FOR OIL PALM PROTECTION ... Maturity & Growth Stages; Oilseed Crops; Parasites -biocontrol; Predators -biocontrol; ...**4.0305**

MICRONUTRIENTS IN TREE CROP NUTRITION ... Boron; Cola; Iron; Management; Soil Testing; Zinc; ...**9.0124**

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Chrysomelideae; Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

SOIL ACIDITY AND THE GROWTH OF THE OIL PALM ... Lime; Management; Sand; Soil pH; Trace Metals; ...**9.0295**

EXPERIMENT 9-2 - TRACE ELEMENT EXPERIMENT ... Boron; Management; Molybdenum; Zinc; ...**9.0303**

Injection

ELIMINATION OF UNWANTED LOW GRADE HARDWOOD TREES FROM FOREST STANDS AND PLANTATIONS ... Forests; Selectivity of Pesticides; Time & Motion Studies; ...**9.0358**

Postemerge Application

HERBICIDE EXPERIMENTATION ON COTTON ... Continuous Humid; ER 5461; GS 16068; MSMA; ...**1.0012**

HERBICIDE EXPERIMENTATION ON COTTON ... Dystric Nitosols; Fiber Crops; Humid 4 Months; Management; Pesticides -other; Preemerge Application; ...**1.0026**

CONTROL OF WEEDS IN RICE ... Cereal Crops; Irrigation -general; Moisture Deficiency; Propanil; ...**3.0004**

HERBICIDE EXPERIMENTS WITH COTTON ON ALLUVIALLY DISTRIBUTED SOILS ... Cyperus Rotundus; Grass -nonspecific; Herbicides -nonspecific; ...**8.0048**

HERBICIDE SCREENING ... Cereal Crops; Continuous Humid 7 Months,Plus; Herbicides -nonspecific; ...**9.0204**

Preemerge Application

HERBICIDE EXPERIMENTATION ON COTTON ... Continuous Humid; ER 5461; GS 16068; MSMA; Postemerge Application; ...**1.0012**

HERBICIDE EXPERIMENTATION ON COTTON ... Dystric Nitosols; Fiber Crops; Humid 4 Months; Management; Pesticides -other; ...**1.0026**

CHEMICAL WEED CONTROL IN SUGARCANE ... Fenac; Grasses or Sedges; Pesticides -other; Saccharum; Sugar Crops; ...**3.0116**

CHEMICAL DESTRUCTION OF WEEDS ON A PLOT OF YAMS (DIOSCOREA) ... Continuous Humid; Diuron; Horticultural Crops; Management; Paraquat; Selectivity of Pesticides; ...**4.0183**

SUGAR CANE HERBICIDE TRIAL ... D, 2,4-; Diuron; Management; Preplant Application; Sugar Crops; ...**9.0002**

POST-PLANTING HERBICIDE TRIAL FOR RICE ... Cereal Crops; Humid 6 Months; Marsh; Timing -other; ...**9.0008**

DISEASES OF KOLA IN NIGERIA ... Cola; Fomes; Phytopathology; ...**9.0142**

AGRONOMIC STUDIES ON IRRIGATED, RAINFED LOWLAND AND UPLAND RICE ... Bentazon; D, 2,4-; Drought Resistance; Grass -nonspecific; Irrigation -general; Pesticides -other; Rain; ...**10.0001**

STUDY OF HERBICIDE PREPARATIONS ON GROUNDNUTS ON SANDY SOILS ... Ferric Luvisols; Humid 3 Months; Oilseed Crops; Prometryne; Sand; ...**11.0147**

EXPERIMENTAL USE OF CHEMICAL HERBICIDES IN A COTTON PLANTATION ... Diuron; Ferric Luvisols; Humid 3 Months; Surface -soil; ...**11.0170**

EXPERIMENT ON CHEMICAL WEEDING OF A COTTON PLANTATION WITH 3 HERBICIDE PREPARATIONS ... Cotoran; Fiber Crops; Persistance of Residues; Pesticides -other; Surface -soil; ...**13.0049**

TEST OF POSSIBLE PHYTOTOXICITY FOR COTTON PLANTS OF COMPOUNDS WITH HERBICIDAL ACTIVITY ... Cotoran; Fiber Crops; ...**13.0050**

EXPERIMENT WITH TRIAZINE HERBICIDES ON SORGHUM ... Cereal Crops; Fiber Crops; Oilseed Crops; Pulse Crops; Sorghum Vulgare (Grain); ...**14.0027**

Preharvest Application

USE OF GROWTH REGULATORS IN COFFEE HUSBANDRY ... Ethrel; Germination; Management; Thiourea; ...**9.0146**

Preplant Application

SUGAR CANE HERBICIDE TRIAL ... D, 2,4-; Diuron; Management; Preemerge Application; Sugar Crops; ...**9.0002**

PRE-PLANTING HERBICIDE TRIAL ON RICE ... Dalapon; Grass -nonspecific; Humid 6 Months; Planavin; ...**9.0004**

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Management; Plant Pathogenetic Fungi; Root Rot; Space Competition; Terminalia; ...**9.0086**

EXPERIMENT WITH TRIAZINE HERBICIDES ON SORGHUM ... Cereal Crops; Fiber Crops; Oilseed Crops; Preemerge Application; Pulse Crops; Sorghum Vulgare (Grain); ...**14.0027**

Row Application

CULTIVATION TECHNIQUES FOR SESAME ... Management; Planting Methods -other; Sesamum; Side Dressing; ...**14.0021**

Seed Treatment

GROUNDNUT IMPROVEMENT PROGRAMME ... Disease Resistance; Fats - Lipids & Oils; Management; Russetting; Seed Production; ...**2.0005**

SUGARCANE AGRONOMY ON THE BLACK SOILS OF THE ACCRA PLAINS ... Bladex; Growth Stage of Plant; Saccharum; Simazine; Space Competition; Sulfates; ...**3.0006**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... Damping Off; Fungicides -nonspecific; Humid 7 Months; Phytopathology; Soil-borne; ...**3.0071**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Damping Off; Pesticides -other; ...**3.0176**

INVESTIGATIONS OF FUNGICIDAL SEED DRESSING ... Damping Off; Dry Monsoon 5 Months, Plus; Fungicides -nonspecific; Phytopathology; Soil-borne; ...**3.0197**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Eutric Nitosols; Moist Monsoon 0 to 3 Months; Phytopathology; Soil-borne; ...**3.0205**

CHEMICAL CONTROL MEASURES AGAINST PIRICULARIA ORYZAE ... Continuous Humid; Inoculation; Phytopathology; Piriculariosis; ...**4.0190**

STUDY THE DISINFECTION OF SEEDS ... Benlate; Mercury; Phytotoxicity; Vitavax; ...**4.0274**

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Chrysomelideae; Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

Side Dressing

COMPARISON OF METHODS OF APPLICATION OF FERTILIZERS ON RICE ... Humid 2 Months; Management; Placement; Subsoil Application; ...**11.0123**

COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT EAST-MONO (PLATEAUX REGION) ... Costs; Management; Sulfur; ...**13.0052**

Subsoil Application

Surface -soil

Systemic Application

Time-release Capsules

Top Dress Application

Aquaculture

See Fish & Wildlife Biology

Aquatic Ecology

See Ecology, Animal

Aquatic Plants

See Weeds

Control of Plants ...

Aquatic Soils

Arachnida

Acarina

Eriophyidae

NEMATOLOGICAL STUDIES ON COTTON PLANTS AND DIFFERENT FIBRE PLANTS IN DAHOMEY ... Corchorus; Parakou Virus; Phytopathology; Surveys; Vectors; ...**4.0072**

NEMATOLOGICAL STUDY OF CHLOROSIS OF LEGUMINOUS PLANTS AND OF STUNTING ("CLUMP") OF GROUNDNUTS IN UPPER VOLTA ... Cajanus; Chlorosis; Leguminosae -other; Phytopathology; Stunt Diseases; ...**4.0073**

NEMATODES OF SUGARCANE ... Diseases; Phytopathology; Virulence and Pathogenicity; ...**9.0264**

NEMATODES OF VEGETABLES ... Capsicum; DD; Lycopersicum; Nemagon; Nematode Resistance; Phytopathology; ... **9.0265**

SURVEY OF MAIZE NEMATODES ... Decline; Phytopathology; Plant Nematodes -nonspecific; Surveys; ...**9.0271**

HOST STATUS OF PRATYLENCHUS SPECIES ... Leguminosae -other; Nematode Resistance; Phytopathology; ...**9.0272**

STUDY OF VARIETIES OF TOMATO RESISTANT TO NEMATODES ... Lycopersicum; Nematode Resistance; Phytopathology; Soil Environment; Surveys; ...**11.0046**

CHLOROSIS ON GROUNDNUTS AND LEGUMINOUS PLANTS ... Cajanus; Chlorosis; Glycine Max; Nemagon; Phytopathology; Tephrosia; ...**14.0015**

Asparagine
See Amino Acids

Atrazine
See Pesticides
Herbicides

Atriplex
See Plants - Dicots
Chenopodiaceae

Attenuated Vaccine
See Vaccines

Attractants
See Pesticides

Attractants -physical
See Pest Control Measures
Physical Control

Audio Frequencies, Noise
See Environments, Plant

Autopsy
See Veterinary Medicine

Auxin
See Hormones

Avena Sativa
See Plants - Monocots
Gramineae

Azodrin
See Pesticides
Insecticides

Baby Foods
See Food Science and Technology

Bacillus
See Bacteria

Back Cross
See Genetics
Genetic & Breeding Methods

Bacteria

BIOLOGICAL RESEARCH STUDIES ON MIRID OF COCOA - DISTANTIELLA THEOBROMAE ... Disease -biocontrol; Entomology, Physiology; Host Preference, Host-insect; Rearing of Insects; ...**4.0063**

BACTERIOLOGICAL INQUIRY ON SLAUGHTERED ANIMALS ... Carcass Evaluation; Melioidosis; Mycobacterium Tuberculosis; Tuberculosis; Veterinary Medicine; ...**8.0005**

SURVEY OF THE DISEASES OF THE IMPORTANT VEGETABLES IN NIGERIA ... Fungi; Phytopathology; Surveys; ... **9.0282**

LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Histology and Cytology; Leptospiroses; Pathology -mammal; Veterinary Medicine; ...**11.0104**

Anaerobic Bacteria

INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM ... Bacterial Toxins; Clostridia; Etiology; Pathology -mammal; Toxoid Vaccine; Water Environment; ...**11.0109**

Bacillus

CONTROL OF COSMOPHILIA FLAVA ... Disease -biocontrol; Fiber Crops; Insecticides -nonspecific; Thuricide; ...**4.0279**

BIOLOGICAL CONTROL OF THE BROWN LEAF SPOT DISEASE OF RICE USING ORGANISMS ANTAGONISTIC TO THE PATHOGEN ... Brown Spot; Helminthosporium; Phytopathology; Soil-borne; ...**9.0217**

STUDY OF THE POSSIBILITIES OF BIOLOGICAL CONTROL OF RICE PESTS ... Disease -biocontrol; Insecta; Population Dynamics; Thuricide; ...**11.0136**

Brucella

BRUCELLOSIS - EPIDEMIOLOGICAL SURVEY ... Brucelloses; Epidemiology of Disease; Hygromas Bursitis; ...**11.0110**

Clostridia

INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM ... Bacterial Toxins; Etiology; Pathology -mammal; Toxoid Vaccine; Water Environment; ...**11.0109**

Escherichia Coli

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pasteurella; Pneumonia; Respiratory System; ...**11.0107**

Pasteurella

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Immunity; Rinderpest; Veterinary Medicine; ...**8.0004**

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pneumonia; Respiratory System; ... **11.0107**

PASTEURELLOSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Haemorrhagic Septicaemia; Hemorrhagic; Pasteurelloses; Pets; ...**11.0112**

Pleuropneumonia Group

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Bovidae; Etiology; Pulmonary Syndrome; Rinderpest; ...**11.0097**

BOVINE PLEUROPNEUMONIA - ESTABLISHMENT OF A FREEZE-DRIED, HEAT-RESISTANT VACCINE ... Bacterial Vaccine; Freeze-dry Techniques; Immunity; Pneumonia; Thiosulfates; Veterinary Medicine; ...**11.0103**

BOVINE PLEUROPNEUMONIA - PATHOGENESIS ... Bacterial Toxins; Bovine Pleuropneumonia; Immunity; Veterinary Medicine; ...**11.0106**

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pasteurella; Pneumonia; Respiratory System; ...**11.0107**

BACTERIAL VACCINES - ESTABLISHMENT - IMPROVEMENT ... Bacterial Vaccine; Bovine Pleuropneumonia; Haemorrhagic Septicaemia; Hemorrhagic; ...**11.0111**

VIRESCENCE (A DISEASE) OF THE COTTON PLANT ... Fiber Crops; Insecta -other; Phytopathology; Taxonomy, Animal; Vectors; Virescence; ...**14.0077**

Pseudomonas -nonspecific

STUDIES ON THE BACTERIAL WILTS OF SOLANACEOUS VEGETABLES ... Bacterial Wilt; Phytopathology; Solanaceae -other; Virulence and Pathogenicity; ...**9.0221**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES ... Bacterial Resistance; Eutric Gleysols; Hybrid Breeding -nonspecific; Pedigree; ...**14.0053**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES (2) ... Bacterial Resistance; Fruit Rot; Lycopersicum; Phytopathology; ...**14.0054**

Rhizobium

STUDY OF INOCULATIONS OF RHIZOBIUM ON SOYA ... Continuous Humid; Inoculation; Nitrogen Fixation; Soil Microbiology; ...**4.0198**

SOIL MICROBIOLOGY ... Chlorinated Hydrocarbons; Ferralic Cambisols; Herbicides -nonspecific; Nitrogen Fixation; Sulfur; Toxicity to Microorganisms; ...**9.0179**

A MICROBIOLOGICAL APPROACH TO GRASS/LEGUME COMPATIBILITY STUDIES ... Centrosema; Legume-grass Mixtures; Management; Proteins; ...**9.0214**

THE EFFECT OF HERBICIDES ON RHIZOBIUM ACTIVITIES IN THE SOIL ... Continuous Humid 7 Months,Plus; Nitrogen Fixation; Pesticidal Interaction -other; Pulse Crops; Simazine; Toxicity to Microorganisms; ...**9.0216**

A STUDY OF THE CONTRIBUTION OF FIXED NITROGEN TO THE NUTRITION OF COWPEA (VIGNA UNGUICULATA) ... Continuous Humid 7 Months,Plus; Inoculation; Nitrogen Fixation; Pulse Crops; ...**9.0218**

INOCULATION OF SOYA BEAN SEEDS ... Glycine Max; Inoculation; Management; ...**11.0030**

Rumen Bacteria

MICROORGANISMS IN THE RUMEN AND THEIR ROLE IN NUTRITION ... Cellulase; Cellulose; Goat Husbandry; In Vivo -see Also Feed Rations; Taxonomy, Plant; Vertebrate Nutrition; ...**9.0025**

Salmonella

SALMONELLOSIS - EPIDEMIOLOGICAL SURVEY ON HEALTHY CARRIERS ... Birds; Feces; Rodentia; Salmonelloses; ...**11.0105**

AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT ... Fowl Pox; Immunity; Newcastle Disease; Veterinary Medicine; ...**11.0115**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - VACCINE 9 R AGAINST FOWL TYPHOID AND PULLORUM DISEASE ... Globulins; Poultry -nonspecific; Vaccines; ...**11.0116**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE ... Fowl Cholera; Fowl Typhoid Pullorum Disease; Myxoviruses, True; Poultry -nonspecific; Veterinary Medicine; ...**11.0117**

Soil Bacteria

RHIZOSPHERE MICROFLORA CONTRIBUTION TO PHOSPHATE DISSOLUTION ... Continuous Humid 7 Months,Plus; Phosphorus; Removal of Nutrients from Soil; Rhizosphere; Soil Microbiology; ...**9.0255**

Vibrio Fetus

VIBRIOSIS - EPIDEMIOLOGICAL SURVEY ... Brucelloses; Epidemiology of Disease; Globulins; Vagina; Veterinary Medicine; Vibriosis; ...**11.0108**

Xanthomonas

CASSAVA BREEDING ... Bacterial Wilt; Cercospora; Disease Resistance; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Phytopathology; ...**9.0182**

STUDIES ON THE BACTERIAL LEAF BLIGHT OF COWPEA (VIGNA UNGUICULATA (L) WALP) ... Blight Diseases; Diptera; Pulse Crops; Vectors; ...**9.0215**

STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA) ... Bacterial Wilt; Insecta; Manihot; Phytopathology; Taxonomy, Plant; Vectors; ...**9.0220**

Bacterial Resistance
See Plant Resistance

Bacterial Toxins
See Toxic Substances

Bacterial Vaccine
See Vaccines

Bacterial Wilt
See Plant Diseases
Wilts

Bagasse
See Feed Science and Technology
By-products- Plant(Vegetative)

Bait Traps
See Pest Control Measures
Physical Control

Baking Food
See Food Science and Technology
Processing of Food

Balance of Nature
See Ecology, Plant

Band Application
See Application Methods

Banks and Reference Standards

Plant Parts Bank

VARIETAL IMPROVEMENT OF COWPEA ... Breeding & Genetics; Disease Resistance; ...**3.0007**

MANGO VARIETY MUSEUM ... Humid 7 Months; Management; ...**3.0066**

ESTABLISHMENT OF CLONE BANKS ... Cedrela; Leguminosae -other; Terminalia; Triplochiton; ...**3.0085**

COLLECTION AND CLASSIFICATION OF YAM CULTIVARS ... Breeding & Genetics; Genetics; Plant Morphology; ...**3.0159**

INTRODUCTION OF EXOTIC PLANTS ... Cocos; Disease Resistance; Insect Resistance; Phenology, Life Cycle; Triticum; ...**3.0208**

PLANT EXPLORATION AND COLLECTION ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Cyclamate; Mutation; Plant Resistance; Sugar -nonspecific; ...**3.0209**

MAINTENANCE OF A WORKING COLLECTION FOR INUNDATED RICE-FIELDS ... Breeding & Genetics; Continuous Humid; Plant Morphology; ...**4.0165**

MAINTENANCE OF A WORKING COLLECTION FOR IRRIGATED RICE ... Breeding & Genetics; Continuous Humid; Plant Morphology; ...**4.0166**

FLUCTUATION AND VARIABILITY OF THE FACTORS OF RESISTANCE TO DROUGHT IN THE GENUS ORYZA ... Breeding & Genetics; Continuous Humid; Drought Resistance; Humidity; Oryza -other; ...**4.0172**

VARIETAL COLLECTION OF MAIZE ... Breeding & Genetics; Continuous Humid; ...**4.0175**

VARIETAL COLLECTION OF YAMS ... Breeding & Genetics; Continuous Humid; Intraspec. Genetic Relations; ...**4.0178**

VARIETAL COLLECTION MANIOC ... Breeding & Genetics; Continuous Humid; Manihot; ...**4.0180**

Seed Bank

Barriers & Weirs

See Pest Control Measures
Physical Control

Basal Rot

See Plant Diseases
Rots

Basidiomycetes

See Fungi

Baytex

See Pesticides
Insecticide - Acaricide

Beef Husbandry

See Animal Husbandry

Beer

See Food Science and Technology
Alcoholic Beverages

Behavior -vertebrate

See Vertebrate Physiology

Behavioral Ecology

See Ecology, Animal

Benlate

See Pesticides
Fungicides

Bentazon

See Pesticides
Herbicides

Benthic Fauna

Berenil

See Pesticides
Antiprotozoal

Besnoitiosis

See Animal Pathology

Beverage Crops

See Agronomy
See Entomology, Applied
Agronomic Pests on
See Weeds
Control of Weeds in ...

Beverages -other

See Food Science and Technology

Buildings, Farm
See Farm Structures & Design

Burning or Flaming
See Pest Control Measures
Physical Control

Burning Effect
See Environments, Animal

Butt Rot
See Plant Diseases
Rots

By-products- Animal
See Feed Science and Technology

By-products- Industrial
See Feed Science and Technology

By-products- Plant(Vegetative)
See Feed Science and Technology

B9
See Pesticides
Plant Growth Regulators

C 9491
See Pesticides
Insecticides

Caffeine
STUDIES ON VARIOUS YIELD AND QUALITY FACTORS IN KOLA ... Cola; Intraspec. Genetic Relations; Management; ...**9.0137**

CROP UTILIZATION PROJECT ... By-products- Plant(Vegetative); Chocolate & Cocoa; Compost; Food Processing Wastes; Nuts & Nutmeats; Preserves & Jelly; ...**9.0154**

Cajanus
See Plants - Dicots
Leguminosae

Calcaric Fluvisols
See Soil Unit Classification
Fluvisols

Calcaric Regosols
See Soil Unit Classification
Regosols

Calcium
EXPERIMENTS WITH NATURAL PHOSPHATES OF ANECHO (TOGO) ... Phosphates; Seasonal Application; Source of Fertilizer; ...**1.0022**

GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

STUDY OF THE COMPOSITION OF THE CORTEX OF THE PODS IN RELATION TO RESISTANCE TO BLACK-POD ... Black Pod; Deficiencies; Moisture Content -plants; Nutritional Regulation (Host); Phytopathology; Potassium; ...**4.0137**

STUDY THE MINERAL NUTRITION OF OIL PALM ACCORDING TO THE PLANT MATERIAL ... Deficiencies; Management; Phosphorus; Sulfur; ...**4.0299**

STUDY FORMS OF PHOSPHATE FERTILIZERS FOR THE COCONUT PALM ... Cocos; Fertilizer Toxicity; Fluorine; Formulation, Fertilizer; Management; Phosphates; ...**4.0321**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON GROWTH ... Growth Stage of Plant; Magnesium; Management; Nitrogen; Phosphorus; Potassium; ...**5.0004**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON YIELD ... Magnesium; Management; Nitrogen; Phosphorus; Potassium; ...**5.0005**

THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF THE LAYING HEN ... Chicken, Domestic; Egg Production; Inorganic Elements in Feeds; Management; Phosphorus; Poultry Rations; ...**9.0021**

MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM) ... Magnesium; Nitrogen; Potassium; Sorghum Vulgare (Grain); ...**11.0059**

STUDY OF MINERAL DEFICIENCY COMPLEXES ... Forage, Pasture or Range; Inorganic Elements in Feeds; Management; Phosphorus; Water Utilization -animal; ...**11.0082**

Calcium - Other Than Lime
See Soil Nutrients/Fertilizers

Calf Rations, Starter Rations
See Feed Science and Technology
Animal Rations

Cambic Arenosols
See Soil Unit Classification
Arenosols

Cambisols
See Soil Unit Classification

Canavalia
See Plants - Dicots
Leguminosae

Candida
See Fungi

Canidae
See Mammals
Carnivora

Cankers
See Plant Diseases

Capital & Financial Management
See Economics
Production and Processing

Capsicum
See Plants - Dicots
Solanaceae

Captan
See Pesticides
Fungicides

Carbohydrates
See Also Plant Physiology
Metabolism

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen

Carbon

See Also Isotopes

Radioactive Isotopes

Carbon Dioxide

Charcoal

Cereal Grains or Grasses
See Feed Science and Technology

Cereal Product Development
See Utilization of Ag Wastes

Cereal Products
See Food Science and Technology

Cesium
See Isotopes
Radioactive Isotopes

Cestoda
See Platyhelminthes

Chalcididae
See Insecta
Hymenoptera

Charcoal
See Carbon

Chemical Analysis of Food
See Food Science and Technology
Food Quality

Chemical Materials
See Materials

Chemical Tillage or Nontillage
See Soil Tillage

Chemistry -related Fields

Distillation
THERMAL DECOMPOSITION OF WOOD CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; Thermal Decomposition; Wood Chemistry; ...**3.0108**

Drying
TECHNOLOGY OF NATURAL RUBBER - PROCESSING OF THE RUBBER IN A GRANULAR FORM ... Forms -other; Harvest and Storage; Instrumentation, Equipment; Latex; Rubber -natural; Two Humid Seasons; ...**4.0257**

STUDY THE DIFFERENT FACTORS WHICH INFLUENCE THE INDUSTRIAL PICKING YIELD OF COTTON IN THE IVORY COAST ... Cellulosic Fiber; Crop Production, Harvesting; Fiber Cleaning; Humidity; ...**4.0283**

STUDY OF PROPERTIES AND CHARACTERISTICS OF NIGERIAN FOREST TIMBER SPECIES ... Fungal Resistance; Machining; Pathology, Forest; Plant Morphology; Wood Preservation & Seasoning; Wood Structure & Properties; ...**9.0095**

NIGERIAN GROWN SPECIES FOR TRANSMISSION POLES ... Construction Materials; Electric Power Transmission; Nauclea; Wood; Wood Structure & Properties; ...**9.0099**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ...**9.0105**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Khaya; Nauclea; Triplochiton; Wood Preservation & Seasoning; ...**9.0106**

Flotation
EDIBLE AND INDUSTRIAL GUMS ... Cosmetics; Foam Fractionation; Forest Product Development; Gums and Resins; ...**3.0101**

Foam Fractionation
EDIBLE AND INDUSTRIAL GUMS ... Cosmetics; Flotation; Forest Product Development; Gums and Resins; ...**3.0101**

Industrial Operation
ACTIVATED CHARCOAL ... Charcoal; Forest Product Development; Scrub Timber Utilization; Wood Chemistry; ...**3.0107**

THERMAL DECOMPOSITION OF WOOD CHARCOAL ... Charcoal; Forest Product Development; Scrub Timber Utilization; Thermal Decomposition; Wood Chemistry; ...**3.0108**

Setting, Curing
TIMBER SPECIES FOR WOOD WOOL CEMENT SLABS ... Construction Materials; Forest Product Development; Forms - other; Wood; ...**3.0103**

Thermal Decomposition
THERMAL DECOMPOSITION OF WOOD CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; Wood Chemistry; ...**3.0108**

Wood Chemistry
ACTIVATED CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; ...**3.0107**

THERMAL DECOMPOSITION OF WOOD CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; Thermal Decomposition; ...**3.0108**

Chemurgic Crops
See Utilization of Ag Wastes

Chenopodiaceae
See Plants - Dicots

Cherelle Wilt
See Plant Diseases
Wilts

Chicken, Domestic
See Birds

Child Developmental Stages
COMMERCIAL PRODUCTION OF SOY-OGI AND GARI ... Food Proteins; Nutritive Value of Food; ...**9.0060**

PHYSICO-CHEMICAL AND BIOCHEMICAL STUDIES ON THE STARCH AND PROTEIN OF RICE ... Ligase; Nitrates; Proteins; Starch; ...**10.0009**

Chlorhexidine
See Also Pesticides
Disinfectants & Antiseptics

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Dermatophilus; Immunity; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**11.0113**

Chlorideae -other
See Plants - Monocots
Gramineae

Chlorides
See Chlorine

Chlorinated Hydrocarbons
See Pesticides

Two Humid Seasons

Dry Monsoon 5 Months, Plus

Moist Monsoon

Humid 2 Months

Humid 5 Months

Climate- Cool Winter Tropical

Summer G

Humid 2 Months

Climate- Hot Tropical Desert

Win. Tp Monsoon Desert

Climate- Humid Equatorial

Humid

Continuous Humid

Rainfall Surplus

Two Humid Seasons

Moist Monsoon, 1 to 3 Dry M.

Continuous Humid 7 Months,Plus

Humid 6 M.or Less

Two Humid Seasons-7 Month,Plus

Climate- Marine Savanna Trop.

Dry Monsoon 4 to 5 Months

CAUSES OF MASTITIS IN DAIRY CATTLE AT AGRICULTURAL RESEARCH STATION ... Mastitis; ...**3.0012**

RATE OF GAIN OF CROSSBREED CATTLE ON NATIVE PASTURE AND SUPPLEMENTED FEED ... Forage, Pasture or Range; Growth Rate; Management; ...**3.0014**

NUTRITIONAL STUDIES WITH PIGS USING DIETS CONTAINING MAINLY LOCALLY PRODUCED FEED STUFFS ... Management; Swine Rations; Vertebrate Nutrition; ...**3.0015**

THE PRODUCTIVITY OF IRRIGATED PASTURES ... Grass -nonspecific; Irrigation; Irrigation -general; Management; ... **3.0016**

CONTROL OF SKIN DISEASES OF FARM ANIMALS ... Skin or Special Derivatives; Skin Diseases -other; Veterinary Medicine; ...**3.0017**

PRODUCTION OF SORGHUM AS A GRAIN AND FODDER CROP FOR LIVESTOCK ... Forage, Pasture or Range; Grain Sorghum, Milo; Sorghum Vulgare (Forage); Sorghum Vulgare (Grain); ...**3.0018**

STUDIES WITH THE SMALL RUMINANTS ... Bovidae; Sheep Husbandry; Veterinary Medicine; ...**3.0019**

FIELD TRIALS OF SOYA BEAN PRODUCTION ... Glycine Max; Management; ...**3.0020**

TILLAGE SYSTEMS FOR TROPICAL AGRICULTURE ... Soil Tillage Methods -other; ...**3.0021**

TICK SURVEY ON SELECTED AREAS ON THE ACCRA PLAINS ... Ixodidae; Maturity & Growth Stages; Surveys; ... **3.0028**

SWEET POTATO ENTOMOLOGY ... Curculionidae; Economics of Chemical Control; Ferric Luvisols; Ipomoea; Vectors; ... **9.0188**

Moist Monsoon 0 to 3 Months

INVESTIGATIONS ON THE CAPE ST. PAUL WILT DISEASE OF COCONUT ... Cocos; Disease Resistance; Forecast Outbreak - Plant Dis.; Surveys; Wilts; ...**3.0111**

CROPS SEQUENCE TRIAL ... Disease Resistance; Fallowing; Management; ...**3.0200**

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Eutric Nitosols; Fibers; Management; ... **3.0201**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH FIBRE AND SEED YIELDS OF KENAF, HIBISCUS CANNABINUS L. ... Eutric Nitosols; Fibers; Management; ...**3.0202**

EFFECTS OF DIFFERENT DATES OF PLANNING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Eutric Nitosols; Fibers; Management; Timing of Planting Procedures; ...**3.0203**

DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE ... Breeding & Genetics; Eutric Nitosols; Insect Resistance; Nematode Resistance; Plant Nematodes -nonspecific; Selfing; ...**3.0204**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Eutric Nitosols; Phytopathology; Soil-borne; ...**3.0205**

EFFECT OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA ... Eutric Nitosols; Fibers; Management; Timing of Planting Procedures; Urena; ...**3.0206**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CARCHORUS, CAPSULARIS ... Corchorus; Eutric Nitosols; Fibers; Management; Timing of Planting Procedures; ...**3.0207**

STUDY THE POTENTIAL FERTILITY OF SOILS ... Dystric Nitosols; Management; Movement, Availability; ...**13.0001**

MANIOC (CASSAVA) - PERIOD FOR PROPAGATION BY CUTTINGS AND DATE OF HARVEST ... Carbohydrates; Dystric Nitosols; Harvest and Storage; Management; Manihot; Starch; ...**13.0002**

PRODUCTION OF MAIZE AND MANIOC IN ASSOCIATED CULTIVATION ... Companion Cropping; Competition; Dystric Nitosols; Management; Manihot; Timing of Planting Procedures; ...**13.0003**

FERTILIZATON OF MANIOC ... Dystric Nitosols; Management; Manihot; Starch; ...**13.0004**

STUDY OF THE TOGO NATURAL PHOSPHATE AS A BASIC FERTILIZER ... Costs; Dystric Nitosols; Movement, Availability; Source of Fertilizer; ...**13.0005**

MODALITIES FOR USE OF THE TOGO PHOSPHATE ... Dystric Nitosols; Movement, Availability; Source of Fertilizer; ...**13.0006**

TILLAGE AND FERTILIZATION ... Disking; Dystric Nitosols; Management Effects on Soils; ...**13.0007**

STUDY OF MAINTENANCE FERTILIZATIONS ... Continuous Cropping; Dystric Nitosols; Management; Movement, Availability; ...**13.0008**

NITROGEN BALANCE - NITROGENOUS FERTILIZATION AND ORGANIC MANURING ... C/N Ratio; Dystric Nitosols; Plant Residues -other; Soil Types; ...**13.0009**

SPECIFIC ROLE OF ORGANIC MATTER ON YIELDS ... C/N Ratio; Plant Residues -other; ...**13.0010**

Climate- Semiarid Tropical

STUDY OF CONTINUOUS CULTIVATION ... Continuous Cropping; Fallowing; Field Crops -nonspecific; Removal of Nutrients from Soil; ...**11.0066**

Hot Equatorial or Hot Tropical

ADAPTION TRIAL ON VEGETABLE CROPS ... Brassica Oleracea; Cucurbita; Lactuca; Management; Sprinkler Irrigation; ...**7.0005**

CROPPING TECHNIQUES FOR IRRIGATED RICE ... Drill Application; Management; Planting Methods -other; Pricking Out; ...**8.0001**

STUDY OF SOIL - MOISTURE - PLANT RELATONSHIPS (WATER ECONOMY) ... Chromic Cambisols; Consumptive Use; Humidity; Irrigation; Luvic Arenosols; Soil-water-plant Relationships; ...**8.0009**

FORAGE CROP EXPERIMENTATION ... Chlorideae -other; Management; Mucuna; Panicum; Sorghum Vulgare (Forage); ... **11.0002**

RESEARCH ON VARIETIES OF VIGNA UNGUICULATA WITH GOOD RESPONSE TO INTENSIVE TECHNICS (WATER, FERTILIZERS) ... Management; Soil Moisture; ... **11.0003**

STUDY OF WATER REQUIREMENTS OF COTTON UNDER IRRIGATION ... Irrigation; Irrigation -general; Management; ...**11.0004**

EXPERIMENTS WITH MAIZE AND SORGHUM ... Irrigation; Irrigation -general; Management; Sorghum Vulgare (Grain); ... **11.0005**

RESEARCH ON WHEAT AND BARLEY ... Baking Food; Hordeum Vulgare; Irrigation; Management; Triticum; ...**11.0006**

IMPROVEMENT OF IRRIGATED AGRICULTURE IN THE SENEGAL RIVER VALLEY ... Irrigation; Irrigation -general; Management; ...**11.0007**

COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH ... Low Temp. Above 0 C; Management; ... **11.0008**

AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN ... Climatology; Energy Budgets; Rain Patterns; Wind or Air Movement; ...**11.0009**

CREATION OF VARIETIES OF DORMANT GROUNDNUTS HAVING A SHORT CYCLE (90 DAYS) OR A SEMI-SHORT CYCLE (105 DAYS) ... Breeding & Genetics; Intraspecific Cross; Synthetic Varieties & Blends; ...**11.0044**

STUDY OF BEHAVIOUR OF VARIETIES OF POTATO ... Management; Solanum; ...**11.0048**

BEHAVIOUR STUDY WITH VARIETIES OF EGGPLANT ... Management; Solanum; ...**11.0049**

STUDY THE POSSIBILITIES OF REPLANTING WOODLAND IN THE DELTA OF THE SENEGAL RIVER ... Costs; Eucalyptus; Luvic Arenosols; Prosopis; Soil Types; ... **11.0140**

STUDY THE DIFFERENT SYSTEMS FOR CULTIVATION OF RICE ... Eutric Fluvisols; Eutric Gleysols; Management; Pregermination of Seeds; ...**11.0149**

CONTROL CAMPAIGN AGAINST RHIZOME RICE ... Cereal Crops; Eutric Fluvisols; Eutric Gleysols; Grasses or Sedges; Herbicides -nonspecific; ...**11.0150**

TRIALS OF MOTOR-TILLERS IN THE CONDITIONS OF INUNDATED RICE CULTIVATION ... Crop Production, Harvesting; Eutric Fluvisols; Eutric Gleysols; Management; Seedbed Preparation; ...**11.0151**

Humid 1 Month

STUDY OF THE EFFECTS OF THE NATURAL PHOSPHATE OF TILEMSI (MALI) ON ANNUAL CROPS ... Calcaric

Humid 2 Months

Humid 3 Months

SHORTENING OF THE STRAW OF THE LOCAL MATERIAL - SMALL MILLET ... Back Cross; Breeding & Genetics; Ferric Luvisols; Fungal Resistance; Setaria; ...**14.0033**

IMPROVEMENT OF LOCAL SMALL MILLET BY RECURRENT SELECTION ... Breeding & Genetics; Ferric Luvisols; Fungal Resistance; Lodging; Recurrent Selection; Sclerospora; ...**14.0034**

IMPORTATION OF FOREIGN LATE AND SEMI-LATE SMALL MILLETS ... Breeding & Genetics; Ferric Luvisols; Light Quantity or Intensity; ...**14.0035**

IMPORTATION OF SEMI-LATE AND LATE SORGHUMS IN DISJUNCTION ... Breeding & Genetics; Ferric Luvisols; Hybrid Breeding -nonspecific; Sorghum Vulgare (Grain); ...**14.0036**

FABRICATION OF EXPERIMENTAL F1 HYBRIDS OF SORGHUM ... Breeding & Genetics; Ferric Luvisols; Heterosis; Male Sterility; ...**14.0037**

IMPROVEMENT OF SEMI-LATE AND LATE SORGHUMS BY HYBRIDATION BETWEEN LINES DESCENDED FROM SELECTION, AND FOREIGN MATERIAL ... Breeding & Genetics; Fungal Resistance; Molds; Sorghum Vulgare (Grain); ...**14.0038**

STUDY OF RIVULET FORMATION AND OF EROSION ON VERTIC SOIL ... Eutric Regosols; Management Effects on Soils; Soil - Bare; Soil-water-plant Relationships; ...**14.0041**

INTRODUCTION OF SPECIES OF RAPID GROWTH ON BROWN VERTIC SOIL ... Chromic Vertisols; Eutric Regosols; Soil Tillage; Soil Types; Vertic Cambisols; ...**14.0042**

Non-dry 3 Months, Plus

MULTILOCAL EXPERIMENTS WITH FLOATING RICE PLANTS ... Depth- Water Level Fluctuation; Management; ...**6.0056**

SELECTION OF LATE VARIETIES OF FLOATING RICE AFTER IRRADIATION ... Breeding & Genetics; Harvest and Storage; Management; Moisture Deficiency; Mutation; ...**6.0057**

INVENTORY OF THE INSECTS HARMFUL TO RICE IN MALI AND EVALUATION OF THE LOSSES ... Cereal Crops; Insecticides -nonspecific; Pests; Rearing of Insects; ...**6.0058**

STUDY OF CROSSINGS BETWEEN FLOATING RICE AND ERECT RICE ... Breeding & Genetics; Pedigree; ...**6.0059**

COLLECTION OF THE FLOATING VARIETIES OF RICE GLACERRIMS AND SATIVA ... Breeding & Genetics; Drought Resistance; Insect Resistance; Seed Bank; ...**6.0060**

STUDY OF DIFFERENT TYPES OF PLOUGHING FOR THE CULTIVATION OF FLOATING RICE ... Deep Plowing; Management; Plowing; Soil Depth; ...**6.0061**

STUDY OF THE PREPARATION OF THE SEED BED AND OF TEAM-CULTIVATION IMPLEMENTS FOR THE CULTIVATION OF FLOATING RICE ... Management; Rotary Tillage, Rotary Hoe; Soil Preparation & Renovation; ...**6.0062**

ERADICATION OF PERENNIAL RICE SPECIES WITH RHIZOMES (O. LONGISTAMINATA) ... Cereal Crops; Cutting Sequence; Diuron; Grasses or Sedges; Management; Oryza - other; ...**6.0063**

STUDY OF THE DORMANCY OF THE WILD VARIETIES OF RICE, O. BREVILIGULATA AND O. LONGISTAMINATA ... Dormancy; Physiology of Weeds; Soil Depth; ...**6.0064**

Climatology
See Meteorology

Clostridia
See Bacteria

Cobalt
See Isotopes
Radioactive Isotopes

Coccidae
See Insecta
Homoptera

Coccidia
See Protozoa

Coccidioides
See Fungi

Coccidiosis
See Animal Pathology

Coccinellidae
See Insecta
Coleoptera

Cocos
See Plants - Monocots
Palmae

Codes and Standards
See Buildings & Land Development

Coffee
See Food Science and Technology

Cola
See Plants - Dicots
Sterculiaceae

Cold Resistance
See Plant Resistance

Coleoptera
See Insecta

Colletotrichum
See Fungi

Combretaceae
See Plants - Dicots

Commercial Fishing
See Fish & Wildlife Biology

Commercial Rations or Feeds
See Feed Science and Technology

Communication

Mass Communication
THE USE OF MASS MEDIA AS A MEANS OF COMMUNICATION BY EXTENSION WORKERS WITH THE FARMERS OF THE WESTERN STATE OF NIGERIA ... Education and Training; Management; Rural Sociology; ...**9.0053**

Companion Cropping
See Cropping Practices

Competition
See Environments, Plant

Compositae
See Plants - Dicots

Composition
See Materials

Cover Crops

See Also Cropping Practices

STUDY OF THE NUTRITION, IN WATER, OF THE OIL PALM ... Leguminosae; Moisture Deficiency; Paniceae -other; Two Humid Seasons; ...**1.0075**

STUDY OF THE INFLUENCE OF THE ANIONS SO4 AND CL ... Soil - Bare; Sulfates; ...**1.0077**

WATER CONSERVATION IN THE DRY SEASON BY IMPROVED CULTURAL PRACTICES ... Continuous Humid 7 Months,Plus; Drought Resistance; Evapotranspiration; Management; Oilseed Crops; Soil-water-plant Relationships; ...**3.0123**

SUSCEPTIBILITY OF SOILS TO EROSION AND EVOLUTION OF THEIR STABILITY UNDER MECHANIZED CULTIVATION - HYDRAULICITY OF A WATERSHED ... Irrigation -general; Management Effects on Soils; Rain; Rainfall Simulators; Rill Erosion; Watersheds; ...**4.0041**

STUDY OF DENSITIES AND ARRANGEMENTS IN PLANTATION OF THE COFFEE-SHRUB ROBUSTA ... Ferric Acrisols; Green Manure; Leguminosae -other; Management; Space Competition; Two Humid Seasons-7 Month,Plus; ...**4.0106**

STUDY OF DENSITIES AND ARRANGEMENTS IN PLANTATION OF THE COFFEE-SHRUB ROBUSTA ... Green Manure; Leguminosae -other; Management; Space Competition; ...**4.0125**

DISEASES OF THE ROOTS OF RUBBER TREES - CONTROL MEASURES AGAINST FOMES LIGNOSUS ... Biocontrol -other; Fomes; Humidity; Phytopathology; Soil Moisture; ...**4.0249**

BIOLOGICAL CONTROL OF DISEASES OF THE ROOTS ... Fomes; Ganoderma; Phytopathology; Two Humid Seasons; ...**4.0250**

REGENERATION OF SOILS AND FERTILIZATION IN REPLANTATION OF OIL PALMS ... Management; Organic Fertility; Tripsaceae -other; ...**4.0301**

WEED STUDIES IN TREE CROPS ... Field Crops -nonspecific; Leguminosae; Mulches; Soil Tillage Sequence / Method; ...**9.0120**

SOIL CONSERVING CROPS ... Cajanus; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Forage Grasses, Pasture, Range; Insect Resistance; Paniceae -other; Pueraria; ...**9.0185**

MOISTURE BALANCE BENEATH CUT CROPS, BARE SOIL AND FALLOW ... Fallowing; Humidity; Management; Soil - Bare; Soil-water-plant Relationships; ...**11.0061**

INTRODUCTION OF FORAGE SHRUBS INTO AN ARID ZONE ... Humid 1 Month; Luvic Arenosols; Orthic Solonetz; Vertic Cambisols; ...**14.0007**

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See Pesticides

Herbicides

Crambidae

See Insecta

Lepidoptera

Creosote

See Pesticides

Wood Preservatives

Crop Contribution to Soil Fert

See Fertilizer Technology

Crop Production, Harvesting

See Farm Machinery, Equip & Power

Crop Rotation, Cropping System

See Pest Control Measures

Cultural Control

Cropping Practices

Companion Cropping

PRODUCTION OF MAIZE AND MANIOC IN ASSOCIATED CULTIVATION ... Competition; Dystric Nitosols; Management; Manihot; Moist Monsoon 0 to 3 Months; Timing of Planting Procedures; ...**13.0003**

PHYTOTECHNICAL STUDIES ON METHODS OF PLANTATION OF CACAO-TREES ... Leguminosae -other; Management; Musa; Planting Methods -other; Shade; ...**13.0022**

VARIETAL EXPERIMENTATION WITH COTTON (ASSOCIATED CULTIVATION) G. BARBADENSE ... Management; ...**13.0034**

Continuous Cropping

TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES ... Bromeliaceae; Erosion Control; Management; Removal of Nutrients from Soil; Two Humid Seasons; ...**4.0148**

SOIL CHEMISTRY ... Fallowing; Iodine; Mineralogy; Silicon; Soil Resistance; ...**9.0178**

LONG TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY UNDER THREE FUNDAMENTALLY DIFFERENT FARMING SYSTEMS ... Compost; Continuous Humid 7 Months,Plus; Ferric Acrisols; Management; Manure; ...**9.0254**

IMPROVEMENT OF THE NITROGENOUS FERTILITY OF THE SOIL BY APPLICATION OF ORGANIC NITROGEN ... C/N Ratio; Lysimeters; Manure; Plant Residues -other; Soil pH; ...**11.0057**

STUDY OF CONTINUOUS CULTIVATION ... Climate- Semiarid Tropical; Fallowing; Field Crops -nonspecific; Removal of Nutrients from Soil; ...**11.0066**

STUDY OF MAINTENANCE FERTILIZATIONS ... Dystric Nitosols; Management; Moist Monsoon 0 to 3 Months; Movement, Availability; ...**13.0008**

Cover Crops

STUDIES ON GERMINATION, GROWTH AND ESTABLISHMENT OF KOLA ... Cola; Dormancy; Germination; Management; Space Competition; ...**9.0138**

Curing Technique

FERTILIZER TRIALS ON FLUE, FIRE AND AIR CURED TOBACCO ... Continuous Humid 7 Months,Plus; Costs; Management; Nicotiana; Placement; ...**3.0143**

AIR CURED TOBACCO VARIETY TRIAL ... Continuous Humid 7 Months,Plus; Management; Nicotiana; ...**3.0144**

TREATMENT OF COFFEE AT THE CROP-HUSBANDRY STAGE ... Drying; Harvest and Storage; Solar Light; ...**4.0138**

Intercropping

COCONUT INTERCROPPING TRIAL ... Cocos; Continuous Humid; Management; Manihot; Oilseed Crops; ...**3.0044**

RUBBER INTERCROPPING EXPERIMENT ... Continuous Humid; Fomes; Green Manure; Management; Manihot; ...**3.0050**

INTERCROPPING OF SHEEP UNDER PLANTATION CROPS ... Citrus; Management; Mangifera; Persea; ...**3.0059**

OIL PALM SPACING AND DENSITY TRIALS ... Management; Space Competition; ...**3.0126**

COMPARISON OF MONOCROPPING AND INTERCROPPING OF SOME FIELD CROPS ... Management; Sorghum Vulgare (Grain); Space Competition; ...**3.0168**

INTERCROPPING WITH SORGHUM ... Competition; Light Quantity or Intensity; Management; Multiple Cropping; Sorghum Vulgare (Grain); ...**9.0158**

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Chrysomelideae; Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

DEVELOPMENT OF IMPROVED CROPPING PATTERNS FOR SMALL ASIAN RICE FARMS ... Cereal Crops; Management; Phaseolus; Rain; ...**10.0011**

CULTIVATION OF GROUNDNUTS IN ANACARDIUM (CASHEW NUT) PLANTATION DURING THE FIRST FEW YEARS OF DEVELOPMENT OF THE TREE ... Costs; Management; Sesamum; ...**14.0010**

Multiple Cropping

FERTILISER REQUIREMENTS OF IRRIGATED RICE ON THE BLACK SOILS, ACCRA PLAINS ... Formulation, Fertilizer; Iron; Management; Sulfur; ...**3.0003**

BIOLOGY AND CONTROL OF CEREAL STEM BORERS (LEPIDOPTERA) ... Continuous Humid 7 Months,Plus; Economics of Chemical Control; Parasites -biocontrol; Sevin; ... **3.0136**

POSSIBLE SECOND SEASON CASH CROP FOR FLUE CURED TOBACCO FARMERS ... Continuous Humid 7 Months,Plus; Fertilizer Losses; Management; Production and Processing; Soil and Rock Leaching; Sorghum Vulgare (Grain); ...**3.0146**

VARIETAL EXPERIMENT WORK ON SOYA ... Glycine Max; Humid 5 Months; Management; ...**4.0211**

VARIETAL EXPERIMENT WORK ON SOYA ... Ferralic Cambisols; Glycine Max; Management; Two Humid Seasons-7 Month,Plus; ...**4.0218**

VARIETAL EXPERIMENT WORK ON SOYA ... Continuous Humid 7 Months,Plus; Glycine Max; Management; ...**4.0222**

VARIETAL EXPERIMENTS WITH RICE ... Breeding & Genetics; Eutric Fluvisols; Humid 2 Months; Irrigation -general; ... **8.0027**

INTERCROPPING WITH SORGHUM ... Competition; Intercropping; Light Quantity or Intensity; Management; Sorghum Vulgare (Grain); ...**9.0158**

STUDIES ON THE IMPROVEMENT OF FIELD PLOT AND SAMPLING TECHNIQUES FOR RICE ... Proteins; Soil Tillage; ...**10.0008**

DEVELOPMENT OF IMPROVED CROPPING PATTERNS FOR SMALL ASIAN RICE FARMS ... Cereal Crops; Intercropping; Management; Phaseolus; Rain; ...**10.0011**

UTILIZATION OF OLEAGINOUS ANNUALS ON IRRIGATED PERIMETERS ... Glycine Max; Irrigation -general; Lycopersicum; Management; Sesamum; ...**14.0011**

Cruciferae

See Plants - Dicots

Crustacea

SCREENING TEST OF SPECIES AND TWO PRESERVATIVES AGAINST MARINE BORERS ... Factors Affecting Insect Pop.; Insect Resistance; Lamellibranchiata; Marine Animals; Maturity & Growth Stages; Wood Preservatives; ...**3.0095**

Hippolyte

SHRIMP CULTURE ... Brackish Water; Shellfish Farming; ... **9.0017**

Cucumis

See Plants - Dicots
Cucurbitaceae

Cucurbita

See Plants - Dicots
Cucurbitaceae

Culicidae -other

See Insecta
Diptera

Cultural Control

See Pest Control Measures

Culturing Food

See Food Science and Technology
Processing of Food

Culturing Techniques

GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

INVESTIGATION INTO THE BIOLOGY AND CONTROL OF ROOT-KNOT NEMATODES ON SOME CROPS ... Continuous Humid 7 Months,Plus; DD; Nemagon; Nicotiana; Population Dynamics; ...**3.0128**

DISEASES OF COFFEE IN NIGERIA ... Fungicides -nonspecific; Phytopathology; Rusts; Screening Potential Pesticides; Seed-borne; Surveys; ...**9.0148**

STUDIES ON THE HOST-PARASITE RELATIONS OF RICE AND HELMINTHOSPORIUM ORYZAE ... Cellular Physiology; Helminthosporium; Inoculation; Phytopathology; ... **9.0285**

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Diagnosis; Fetus; Urogenital System; Viral Vaccines; ...**11.0102**

Curculionidae

See Insecta
Coleoptera

Curing Technique

See Cropping Practices

Cutting Sequence

See Pest Control Measures
Cultural Control

Cyanides

BOVINE OCULAR THELAZIOSIS - TREATMENTS ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Muscidae; Tetramisole; Veterinary Medicine; ...**11.0087**

Cycadales

See Plants - Gymnosperms

Cyclamate

PLANT EXPLORATION AND COLLECTION ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Mutation; Plant Parts Bank; Plant Resistance; Sugar -nonspecific; ...**3.0209**

Cyclophosphamide

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Immunity; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**11.0113**

Cynodon

See Plants - Monocots
Gramineae

Cyperus Rotundus

See Plants - Monocots
Cyperaceae

Cystine

See Amino Acids

Cytoplasm

See Cellular Physiology

Cytoplasmic Sterility

See Genetics
Genetic & Breeding Methods

D, 2,4-

See Pesticides
Herbicides

Dystric Nitosols

See Soil Unit Classification

Nitosols

Echinochloa

See Plants - Monocots

Gramineae

Ecology, Animal

PESTS OF CITRUS ... Citrus; Coccidae; Fruits and Berries; Noctuidae; ...**9.0259**

Aquatic Ecology

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Construction Land Use Effects; Fish & Shellfish Biology; Lakes & Reservoirs; ...**4.0330**

STUDIES ON THE FAUNA OF CONTINENTAL WATERS ... Commercial Fishing; Population Dynamics; ...**11.0072**

DETERMINATION OF PRODUCTION OF FISH OF CONTINENTAL WATERS ... Commercial Fishing; Fish; Lakes & Reservoirs; Population Dynamics; Streams; ...**11.0073**

GENERAL ECOLOGY OF ESTUARINE AND FRESH WATERS ... Estuaries; Growth Rate; Population Dynamics; Streams; Water Quality; ...**12.0005**

Behavioral Ecology

RESEARCH INTO METHODS FOR THE INTEGRATED CONTROL OF COTTON PESTS IN DAHOMEY ... Dystric Nitosols; Fiber Crops; Insect Viruses -other; Integrated Control; Olethreutidae; ...**1.0048**

HYDROBIOLOGY RESEARCHES IN THE VOLTA BASIN ... Fish Food Supply; Plankton; Water Environment; ...**3.0236**

BIOLOGY, ECOLOGY AND CONTROL OF RICE INSECT PESTS ... Crambidae; Habitat Studies; Insect Resistance; Predators -biocontrol; Surveys; ...**10.0003**

GENERAL ECOLOGY OF ESTUARINE AND FRESH WATERS ... Estuaries; Growth Rate; Population Dynamics; Streams; Water Quality; ...**12.0005**

Habitat Studies

STUDY OF THE PARASITISM OF THE COTTON PLANT ... Fiber Crops; Insecta; Population Dynamics; ...**1.0045**

ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Population Dynamics; Rodenticides; ...**4.0059**

BIOLOGICAL AND ECOLOGICAL RESEARCH WORK ON THE ENTOMOLOGICAL FAUNA OF THE HERBACEOUS SWARD OF A PRE-FOREST SAVANNAH ... Energy Budgets; Forests; Mantidae; Population Dynamics; Surveys; ...**4.0061**

BIOGENETIC STUDY OF INSECT MARAUDERS OF COTTON IN THE IVORY COAST ... Homoptera -other; Migration; ...**4.0062**

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Construction Land Use Effects; Fish & Shellfish Biology; Lakes & Reservoirs; ...**4.0330**

TO STUDY THE BIOLOGY AND ECOLOGY OF DIFFERENT SPECIES OF RICE STEM BORERS ... Cereal Crops; Crambidae; ...**9.0014**

BIOLOGY, ECOLOGY AND CONTROL OF RICE INSECT PESTS ... Behavioral Ecology; Crambidae; Insect Resistance; Predators -biocontrol; Surveys; ...**10.0003**

Migration

BIOGENETIC STUDY OF INSECT MARAUDERS OF COTTON IN THE IVORY COAST ... Habitat Studies; Homoptera -other; ...**4.0062**

RESEARCH ON THE AFRICAN MIGRATORY LOCUST ... Environments, Animal; Factors Affecting Insect Pop.; Population Dynamics; Surveys; Tettigonidae; ...**6.0005**

FISH MIGRATION STUDIES ... Commercial Fishing; Osteichthyes -other; ...**9.0196**

Population Dynamics

STUDY OF THE PARASITISM OF THE COTTON PLANT ... Fiber Crops; Habitat Studies; Insecta; ...**1.0045**

HELMINTH PARASITES OF PIGS IN GHANA ... Management; Taenia; ...**3.0029**

STUDIES ON AMBROSIA BEETLE POPULATIONS IN THE FOREST ZONES OF GHANA ... Coleoptera -other; Forestry Insects; Scolytidae; Surveys; ...**3.0092**

STUDIES ON THE BIONOMICS OF POTENTIALLY DANGEROUS INSECTS ATTACKING INDIGENOUS PLANTATIONS OF ACCEPTED EXPORT TIMBER SPECIES ... Chlorophora; Forests; Pyralidae; Terminalia; ...**3.0093**

INVESTIGATION INTO THE BIOLOGY AND CONTROL OF ROOT-KNOT NEMATODES ON SOME CROPS ... Continuous Humid 7 Months,Plus; Culturing Techniques; DD; Nemagon; Nicotiana; ...**3.0128**

INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON ... Economics of Chemical Control; Gelechiidae; Noctuidae; Surveys; Trap Crops; ...**3.0132**

TERMITE ECOLOGY AT FUMESUA, GHANA ... Factors Affecting Insect Pop.; Forests; Soil Environment; ...**3.0234**

ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Habitat Studies; Rodenticides; ...**4.0059**

BIOLOGICAL AND ECOLOGICAL RESEARCH WORK ON THE ENTOMOLOGICAL FAUNA OF THE HERBACEOUS SWARD OF A PRE-FOREST SAVANNAH ... Energy Budgets; Forests; Mantidae; Surveys; ...**4.0061**

BIOGENETIC STUDY OF INSECT MARAUDERS OF COTTON IN THE IVORY COAST ... Habitat Studies; Homoptera -other; Migration; ...**4.0062**

STUDY OF THE BORER OF THE MELIACEAE - HYPSIPYLA ROBUSTA (MOORE) ... Forestry Insects; Insecta -other; Insecticides -nonspecific; Khaya; Parasites -biocontrol; ...**4.0085**

ECOLOGICAL OBSERVATIONS ON EARIAS SPECIES ... Entomology, Physiology; Fiber Crops; High Temp. 30 C or Above; Rearing of Insects; Sex Ratio; ...**4.0282**

BIOLOGY OF COELAENOMENODERA ELAEIDIS, OIL PALM PEST ... Insecta -other; Oilseed Crops; Rearing of Insects; ...**4.0304**

METHODS OF BIOLOGICAL CONTROL OF COELAENOMENODERA ELAEIDIS ... Insecta -other; Light; Oilseed Crops; Parasites -biocontrol; Rearing of Insects; Temperature -air; ...**4.0307**

CONTROL OF ORYCTES IN THE IVORY COAST ... Entomology, Physiology; Insect Attractants; Pueraria; ...**4.0327**

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Construction Land Use Effects; Fish & Shellfish Biology; Lakes & Reservoirs; ...**4.0330**

RESEARCH ON THE AFRICAN MIGRATORY LOCUST ... Environments, Animal; Factors Affecting Insect Pop.; Migration; Surveys; Tettigonidae; ...**6.0005**

INVENTORY OF THE INSECTS HARMFUL TO RICE IN MALI AND EVALUATION OF THE LOSSES ... Cereal Crops; Insecticides -nonspecific; Pests; Rearing of Insects; ...**6.0058**

PROJECT ON ADAPTED CONTROL MEASURES AGAINST THE INSECT AND ACARID PESTS OF FRUIT CROPS ... Cambic Arenosols; Diaspididae; Insecticides -nonspecific; Rearing of Insects; Win. Tp Monsoon Desert; ...**7.0001**

MARKING INSECT PREDATORS OF FOOD COMMODITIES ... Cereal Crops; Dermestidae; Oilseed Crops; Pulse Crops; Radioactive Isotopes; Surveys; ...**8.0010**

POPULATION DYNAMICS OF PLANT PARASITIC NEMATODES IN CULTIVATED SOIL ... Plant Nematodes -nonspecific; Soil-borne; Taxonomy, Animal; ...**9.0044**

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THE COCOA SWOLLEN SHOOT VIRUS DISEASE PROJECT ... Beverage Crops; Insecta; Pathology of Weeds; Swollen Shoot Virus; Virulence and Pathogenicity; ...**9.0129**

BIO-ECOLOGY OF THE COCOA MIRID ... Beverage Crops; Entomology, Physiology; Factors Affecting Insect Pop.; Miridae; Moisture Deficiency; Sex Ratio; ...**9.0130**

BATHYCOELIA THALASSINA (HETEROPTERA) ON CACAO ... Beverage Crops; Hemiptera -other; Maturity & Growth Stages; Parasites -biocontrol; Tachinidae; ...**9.0132**

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PRODUCTIVITY OF NATURAL FORESTS OF NIGERIA ... Forests; Measurement of Trees & Stands; Silviculture; Swamps - Marshes; Wild Type Genotype; ...**9.0080**

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AN ECONOMIC ANALYSIS OF PRIVATE COMMERCIAL PIG FARMING IN THE ACCRA URBAN AREA ... Production and Processing; Swine Industry; ...**3.0038**

FERTILIZER TRIALS ON FLUE, FIRE AND AIR CURED TOBACCO ... Continuous Humid 7 Months,Plus; Curing Technique; Management; Nicotiana; Placement; ...**3.0143**

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IMPROVEMENT OF FORAGE PRODUCTION IN SAVANNAH ZONE BY MODIFICATION OF THE TRADITIONAL SYSTEM ... Broadcast Application; Dry Monsoon 4 M. or Less; Moist Monsoon; Stylosanthea; ...**4.0027**

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TAPPING OF RUBBER TREES - RESEARCH ON THE EQUILIBRIUM BETWEEN YIELD BY THE HECTARE AND YIELD BY WORKER ... Harvest and Storage; Management; Plant Growth Regulators; Supply; Time & Motion Studies; Two Humid Seasons; ...**4.0245**

CUMULATIVE TAPPING OF RUBBER TREES ... Harvest and Storage; Latex; Management; Time & Motion Studies; Two Humid Seasons; ...**4.0247**

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TECHNOLOGY OF NATURAL RUBBER - RUBBERS STRETCHED BY OIL ... Latex; Physical Properties; Rubber -natural; ...**4.0255**

STUDY OF WEEDS IN IRRIGATED RICE ... Cereal Crops; Economics of Chemical Control; Herbicides -nonspecific; Management; ...**5.0016**

FERTILIZER STUDIES ON IRRIGATED AND UPLAND RICE ... Management; Placement; Sand; Swamps - Marshes; Timing of Application -other; ...**5.0017**

COSTS AND METHODS OF DEVELOPING SMALL SWAMPS FOR RICE CULTIVATION ... Crop Production, Harvesting; Management; Swamps - Marshes; Time & Motion Studies; ...**5.0018**

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THE USE OF DISCARDED COCOA BEAN MEAL IN LIVESTOCK FEEDING ... By-products- Plant(Vegetative); In Vivo--see Also Feed Rations; Nutritive Values -plant; Proteins; ...**9.0030**

DEVELOPMENT OF A LOW COST INCUBATOR FOR LOCAL USE ... Buildings & Land Development; Construction, Farm; Heat and Cooling Devices; Poultry Equipment; ...**9.0047**

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STUDY OF A MODEL FOR EXPLOITATION FOR ZOOTECHNICAL PURPOSES ... Farm Enterprises -general; Management; Peanut Shells; Production and Processing; Sorghum Vulgare (Grain); Straw; ...**11.0036**

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STUDY THE POSSIBILITIES OF REPLANTING WOODLAND IN THE DELTA OF THE SENEGAL RIVER ... Eucalyptus; Luvic Arenosols; Prosopis; Soil Types; ...**11.0140**

STUDY OF THE TOGO NATURAL PHOSPHATE AS A BASIC FERTILIZER ... Dystric Nitosols; Moist Monsoon 0 to 3 Months; Movement, Availability; Source of Fertilizer; ...**13.0005**

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AGRONOMIC-ECONOMIC STUDY OF THE NATURAL PHOSPHATES OF TOGO ... Movement, Availability; Natural Resources Economics; Source of Fertilizer; Transportation; ...**13.0043**

COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT KOUVE (MARITIME REGION) ... Management; Sulfur; ...**13.0051**

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COMPARISON OF FORMULAS FOR FERTILIZERS IN COTTON ROTATION AT THE OUTSTATION AT NIANGOULAME AND AT THE PILOT CENTRE AT KABOU ... Boron; Management; Side Dressing; Sulfur; ...**13.0053**

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CULTIVATION OF GROUNDNUTS IN ANACARDIUM (CASHEW NUT) PLANTATION DURING THE FIRST FEW YEARS OF DEVELOPMENT OF THE TREE ... Intercropping; Management; Sesamum; ...**14.0010**

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THE USE OF INDUSTRIAL BY-PRODUCTS IN SHEEP AND GOAT RATIONS ... Bran; Food Science and Technology; In Vivo--see Also Feed Rations; Management; Molasses; Service Industries; ...**9.0033**

STUDY OF MARKET STRUCTURE AND ORGANIZATION WITH SPECIAL REFERENCE TO THE BUYING ARRANGEMENTS OF FOOD CONTRACTORS FOR INSTITUTIONS ... Food Distribution Research; Food Science and Technology; Institutional Management; Market Structure; Service Industries; ...**9.0034**

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Insect Utilization

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Pollination by Bees

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Forests

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Soil Environment

Temperature -air

High Temp. 30 C or Above

Water Environment

Environments, Plant

Audio Frequencies, Noise

Competition

Among Thallophytes

Growth Inhibitors

Light Competition

Moisture Competition

Space Competition

Depth- Water Level Fluctuation

Elevational Levels, Altitude

Energy Budgets

Gas Content -air

Greenhouses

Growth Chamber

Humidity

Hydroponic Studies

Latitude

Light Quantity or Intensity

Darkness

High Intensity Light

Low Intensity Light

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Marsh

Mesic Environments

Moisture Budgets

Photoperiod

Indeterminate

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Precipitation

Rain

Rhizosphere

Saline Soils

Soil - Alkaline

Soil - Bare

Soil pH

Soil Compaction or Density

Soil Composition

Clay

Loam

Loam - Sand Soil

Organic Soils

Sand

Excessive Moisture

Moisture Deficiency

Low Temp. Above 0 C

Thermoperiod

Temperature -soil

High Temp. 30 C or Above

Low Temp. Above 0 C

Temperature -water

Low Temp. Above 0 C

Temperature or Heat Budgets

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AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN ... Climatology; Energy Budgets; Hot Equatorial or Hot Tropical; Rain Patterns; ...**11.0009**

INFLUENCE OF WIND-BREAKS IN AN IRRIGATED PERIMETER ... Humidity; Irrigation; Irrigation -general; Shelter Belts, Windbreaks; Soil Moisture; Temperature -air; ... **14.0005**

Enzyme Kinetics

MALT PRODUCTION FROM LOCAL GRAINS ... Beer; Cereal Crops; Hordeum Vulgare; Malting Food; Sorghum Vulgare (Grain); ...**9.0057**

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ENZYMES AND THEIR VARIATION IN INSECT PESTS OF COCOA ... Cholinesterase; Entomology, Physiology; Gel Electrophoresis; Phosphatase -nonspecific; ...**3.0065**

Catalase

STUDY OF THE RESISTANCE TO DROUGHT OF THE OIL PALM ... Drought Resistance; Management; Plant Physiology; Two Humid Seasons; ...**1.0079**

Cellulase

MICROORGANISMS IN THE RUMEN AND THEIR ROLE IN NUTRITION ... Cellulose; Goat Husbandry; In Vivo--see Also Feed Rations; Rumen Bacteria; Taxonomy, Plant; Vertebrate Nutrition; ...**9.0025**

Cholinesterase

ENZYMES AND THEIR VARIATION IN INSECT PESTS OF COCOA ... Entomology, Physiology; Gel Electrophoresis; Phosphatase -nonspecific; ...**3.0065**

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ENZYMES AND THEIR VARIATION IN INSECT PESTS OF COCOA ... Cholinesterase; Entomology, Physiology; Gel Electrophoresis; Phosphatase -nonspecific; ...**3.0065**

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BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ... **9.0177**

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TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES ... Bromeliaceae; Management; Removal of Nutrients from Soil; Two Humid Seasons; ...**4.0148**

CONTROL OF EROSION OF TROPICAL FERRUGINOUS SOILS ... Humid 1 Month; Luvic Arenosols; ...**8.0020**

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SUGARCANE AGRONOMY ON THE BLACK SOILS OF THE ACCRA PLAINS ... Bladex; Growth Stage of Plant; Saccharum; Simazine; Space Competition; Sulfates; ...**3.0006**

N.P.K. FACTORIALS - FERTILIZER TRIAL IN SUGARCANE ... Irrigation; Irrigation -general; Management; Saccharum; Two Humid Seasons-7 Month,Plus; ...**3.0112**

COMPARISON OF COW MANURE, POULTRY MANURE AND CHEMICAL FERTILIZER ON MAIZE YIELD ... Management; Manure; ...**3.0167**

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FERTILIZATION OF OIL PALM ON TERTIARY FERRALYTIC SANDS ... Ferralsols; Magnesium; Management; Sand; ...**4.0291**

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MAINTENANCE OF FERTILITY IN CROPPING SYSTEMS ... Ferric Luvisols; Humid 4 Months; Management; ...**6.0072**

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RHIZOSPHERE MICROFLORA CONTRIBUTION TO PHOSPHATE DISSOLUTION ... Continuous Humid 7 Months,Plus; Phosphorus; Rhizosphere; Soil Bacteria; Soil Microbiology; ...**9.0255**

MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM) ... Calcium; Magnesium; Nitrogen; Potassium; Sorghum Vulgare (Grain); ...**11.0059**

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THE DISTRIBUTION AND ACTIVITY OF ROOT SYSTEMS OF COCOA ... Management; Phosphorus; Placement; Sand - Loam Soil; Soil Depth; ...**3.0217**

STUDY THE BEST TIME FOR APPLICATION AND FOR FRACTIONATED MANURING OF THE OIL PALM ... Management; ...**4.0294**

STUDY THE TIME OF APPLICATION AND FRACTIONATION OF MANURINGS FOR THE COCONUT PALM ... Chlorine; Magnesium; Movement, Availability; Sulfur; ...**4.0322**

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EXPERIMENTS WITH NATURAL PHOSPHATES OF ANECHO (TOGO) ... Calcium; Phosphates; Seasonal Application; ...**1.0022**

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STUDY OF THE INFLUENCE OF THE ANIONS SO4 AND CL ... Cover Crops; Soil - Bare; Sulfates; ...**1.0077**

FERTILIZER EFFICIENCY STUDIES ON BEANS (PHASEOLUS VULGARIS) AND COWPEA ... Irrigation -general; Management; Nitrogen Fixation; Phosphorus; Soil pH; Timing of Application -other; ...**3.0218**

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STUDY OF THE TOGO NATURAL PHOSPHATE AS A BASIC FERTILIZER ... Costs; Dystric Nitosols; Moist Monsoon 0 to 3 Months; Movement, Availability; ...**13.0005**

MODALITIES FOR USE OF THE TOGO PHOSPHATE ... Dystric Nitosols; Moist Monsoon 0 to 3 Months; Movement, Availability; ...**13.0006**

THE TOGO PHOSPHATE AS AN ANNUAL FERTILIZATION ... Costs; Dry Monsoon 5 Months, Plus; Ferric Luvisols; Management; Sorghum Vulgare (Grain); ...**13.0025**

AGRONOMIC-ECONOMIC STUDY OF THE NATURAL PHOSPHATES OF TOGO ... Costs; Movement, Availability; Natural Resources Economics; Transportation; ...**13.0043**

Timing of Application -other

SUITABILITY FOR RICE OF THE SOILS OF THE MARSHY LANDS OF NORTH DAHOMEY ... Continuous Humid; Humic Gleysols; Humid 4 Months; Management; Marsh; Organic Fertility; ...**1.0001**

RATE AND TIME OF NITROGEN APPLICATION ON MAIZE, YAM AND RICE ... Management; ...**3.0169**

FERTILIZER EFFICIENCY STUDIES ON BEANS (PHASEOLUS VULGARIS) AND COWPEA ... Irrigation -general; Management; Nitrogen Fixation; Phosphorus; Soil pH; ...**3.0218**

USE OF ISOTOPES IN STUDIES ON THE NUTRITION OF GROUNDNUTS ... Broadcast Application; Management; Nitrogen Fixation; Sulfur; ...**3.0219**

STUDY THE TIME OF APPLICATION AND FRACTIONATION OF MANURINGS FOR THE COCONUT PALM ... Chlorine; Magnesium; Movement, Availability; Sulfur; ...**4.0322**

FERTILIZER STUDIES ON IRRIGATED AND UPLAND RICE ... Costs; Management; Placement; Sand; Swamps - Marshes; ...**5.0017**

STUDY OF NITROGENOUS NUTRITION ON ALLUVIALLY DISTRIBUTED SOILS ... Fallowing; Formulation, Fertilizer; Green Manure; Manure; ...**8.0046**

NITROGEN FERTILIZATION IN FLOODED FIELDS - METHODS AND TIMING OF NITROGEN APPLICATION ... Broadcast Application; Eutric Gleysols; Humid 6 Months; Sodium; ...**9.0011**

EFFECTS OF TIME OF APPLICATION OF NITROGEN ON YIELD & OTHER GROWTH CHARACTERISTICS OF UPLAND RICE & RESPONSE OF UPLAND RICE TO PHOSPHORUS ... Elevational Levels, Altitude; Growth Stage of Plant; Management; ...**9.0040**

COFFEE NUTRITION STUDIES ... Isotopes; Management; Removal of Nutrients from Soil; ...**9.0147**

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PHOSPHATE PLACEMENT TRIAL ... Broadcast Application; Ferric Acrisols; Management; Rain; ...**9.0251**

MAIZE FERTILIZER TRIAL ... Management; ...**9.0275**

FIELD TESTING OF NEW RICE TECHNOLOGY AND ADOPTION OF THE NEW TECHNOLOGY THROUGH A PILOT EXTENSION PROGRAM ... Cereal Crops; Herbicides -nonspecific; Insecticides -nonspecific; Management; Rain; ...**10.0004**

STUDY THE PLACE OF MANURING IN A SUCCESSION OF MAIZE - COTTON ... Management; ...**13.0045**

STUDY OF THE RESIDUAL ACTIVITIES OF MINERAL FERTILIZERS ... Ferric Luvisols; Humid 6 Months; Management; Plinthic Luvisols; Sorghum Vulgare (Grain); ...**14.0085**

Types of Applied Fertilizer

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Fertilizing, Planting & Cult

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Fetus

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Diagnosis; Urogenital System; Viral Vaccines; ...**11.0102**

Fiber Cleaning

STUDY THE DIFFERENT FACTORS WHICH INFLUENCE THE INDUSTRIAL PICKING YIELD OF COTTON IN THE IVORY COAST ... Cellulosic Fiber; Crop Production, Harvesting; Humidity; ...**4.0283**

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Agronomic Pests on

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Control of Weeds in ...

Fiber Processing(Raw-material)

Retting

EXPERIMENT ON TECHNIQUES OF RETTING FOR HIBISCUS SABDARIFFA ... Ferric Luvisols; Harvest and Storage; Humid 6 Months; ...**1.0057**

EFFECTS OF AGE AT HARVEST ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS, CANNABINUS, L. ... Continuous Humid 7 Months,Plus; Harvest and Storage; ...**3.0141**

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Continuous Humid 7 Months,Plus; Fibers; Management; ...**3.0172**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Continuous Humid 7 Months,Plus; Fibers; Surface -soil; ...**3.0173**

CULTURAL TECHNIQUES FOR PRODUCTION OF FIBRES FOR SACKING ... Harvest and Storage; Insecticides -nonspecific; Soil Tillage; ...**6.0086**

TECHNOLOGICAL PREPARATION OF NATURAL TEXTILE FIBRES FOR SACKING ... Crop Production, Harvesting; Harvest and Storage; ...**6.0087**

Fibers

See Plant Tissues

Sclerenchyma

Fillers, Extenders

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Finishes of Textiles

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Fire Prevention

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Fiscal Studies

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Income Analysis

Fish

THE CHEMICAL COMPOSITION OF COMMERCIALLY IMPORTANT GHANAIAN FISHES ... Chemical Analysis of Food; Commercial Fishing; Fish and Shellfish; Nutritive Value of Food; Nutritive Values -animal; ...**3.0077**

SELECTION OF FISH SPECIES FOR CULTURE IN BRACKISH WATER ... Brackish Water; Fish Farming; ...**9.0018**

FISHING GEAR TRIALS ... Commercial Fishing; Fish & Shellfish Biology; Fishing Methods and Equipment; Humid 1 Month; ...**9.0194**

FISH POPULATION STUDIES ... Commercial Fishing; Humid 1 Month; Population Dynamics; ...**9.0195**

DETERMINATION OF THE PRODUCTIVITY (OF FISH) OF CONTINENTAL WATERS ... Fish Farming; Fishing Methods and Equipment; Water Environment; ...**11.0071**

DETERMINATION OF PRODUCTION OF FISH OF CONTINENTAL WATERS ... Commercial Fishing; Lakes & Reservoirs; Population Dynamics; Streams; ...**11.0073**

ECOLOGICAL PARASITOLOGY ... Marine Animals; Population Dynamics; Taxonomy, Animal; ...**12.0002**

Cichlidae

STUDY THE MECHANISM OF THE GENETICS OF HYBRIDATION OF TILAPIA SPECIES ... Breeding & Genetics; Fish Farming; ...**4.0329**

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Construction Land Use Effects; Fish & Shellfish Biology; Lakes & Reservoirs; ...**4.0330**

FISH-RICE COMBINATION AND ROTATION STUDIES ... Fish Farming; Management; ...**5.0022**

Osteichthyes -other

THE DEVELOPMENT OF TRADITIONAL FISH PROCESSING ... Fermentation; Fish Product Development; Shelf Life & Storage of Food; ...**3.0074**

FISH MIGRATION STUDIES ... Commercial Fishing; Migration; ...**9.0196**

Salmonidae

THE DEVELOPMENT OF TRADITIONAL FISH PROCESSING ... Fermentation; Fish Product Development; Osteichthyes -other; Shelf Life & Storage of Food; ...**3.0074**

Fish & Shellfish Biology

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Fish & Wildlife Biology

Aquaculture

Aquaculture Rotations

FISH-RICE COMBINATION AND ROTATION STUDIES ... Cichlidae; Fish Farming; Management; ...**5.0022**

Fish Farming

STUDY THE MECHANISM OF THE GENETICS OF HYBRIDATION OF TILAPIA SPECIES ... Breeding & Genetics; Cichlidae; ...**4.0329**

FISH-RICE COMBINATION AND ROTATION STUDIES ... Cichlidae; Management; ...**5.0022**

SELECTION OF FISH SPECIES FOR CULTURE IN BRACKISH WATER ... Brackish Water; Fish; ...**9.0018**

DETERMINATION OF THE PRODUCTIVITY (OF FISH) OF CONTINENTAL WATERS ... Fish; Fishing Methods and Equipment; Water Environment; ...**11.0071**

Fishing Methods and Equipment

FISHING GEAR TRIALS ... Commercial Fishing; Fish; Fish & Shellfish Biology; Humid 1 Month; ...**9.0194**

DETERMINATION OF THE PRODUCTIVITY (OF FISH) OF CONTINENTAL WATERS ... Fish; Fish Farming; Water Environment; ...**11.0071**

Shellfish Farming

SHRIMP CULTURE ... Brackish Water; Hippolyte; ...**9.0017**

Birds - Wildlife Studies

Control of Nuisance Species

STUDY OF RICE PESTS ... Barriers & Weirs; Cereal Crops; Insecta; Management; Rodentia -other; ...**5.0014**

Commercial Fishing

THE CHEMICAL COMPOSITION OF COMMERCIALLY IMPORTANT GHANAIAN FISHES ... Chemical Analysis of Food; Fish; Fish and Shellfish; Nutritive Value of Food; Nutritive Values -animal; ...**3.0077**

FISHING GEAR TRIALS ... Fish; Fish & Shellfish Biology; Fishing Methods and Equipment; Humid 1 Month; ...**9.0194**

FISH POPULATION STUDIES ... Fish; Humid 1 Month; Population Dynamics; ...**9.0195**

FISH MIGRATION STUDIES ... Migration; Osteichthyes -other; ...**9.0196**

STUDIES ON THE FAUNA OF CONTINENTAL WATERS ... Population Dynamics; ...**11.0072**

DETERMINATION OF PRODUCTION OF FISH OF CONTINENTAL WATERS ... Fish; Lakes & Reservoirs; Population Dynamics; Streams; ...**11.0073**

Construction Land Use Effects

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Fish & Shellfish Biology; Lakes & Reservoirs; ...**4.0330**

Fish & Shellfish Biology

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Construction Land Use Effects; Lakes & Reservoirs; ...**4.0330**

FISHING GEAR TRIALS ... Commercial Fishing; Fish; Fishing Methods and Equipment; Humid 1 Month; ...**9.0194**

ECOLOGICAL PARASITOLOGY ... Fish; Marine Animals; Population Dynamics; Taxonomy, Animal; ...**12.0002**

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HYDROBIOLOGY RESEARCHES IN THE VOLTA BASIN ... Behavioral Ecology; Plankton; Water Environment; ...**3.0236**

GENERAL ECOLOGY OF ESTUARINE AND FRESH WATERS ... Estuaries; Growth Rate; Population Dynamics; Streams; Water Quality; ...**12.0005**

Mammals - Wildlife Studies

Control of Nuisance Species

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Barriers & Weirs; DDVP; Phosphorothioate Cpds.; Storage; Tenebrionidae; ...**3.0211**

ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Habitat Studies; Population Dynamics; Rodenticides; ...**4.0059**

STUDY OF RICE PESTS ... Barriers & Weirs; Cereal Crops; Insecta; Management; Rodentia -other; ...**5.0014**

Management

BIOLOGY AND PHYSIOLOGY OF A SAVANNAH RODENT ... Breeding & Genetics; Hormones; Pregnancy; Sexual Cycle; Vagina; ...**4.0060**

Pathology -mammal

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Serology; Veterinary Medicine; ...**11.0099**

LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Histology and Cytology; Leptospiroses; Veterinary Medicine; ...**11.0104**

SALMONELLOSIS - EPIDEMIOLOGICAL SURVEY ON HEALTHY CARRIERS ... Birds; Feces; Rodentia; Salmonelloses; ...**11.0105**

INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM ... Bacterial Toxins; Clostridia; Etiology; Toxoid Vaccine; Water Environment; ...**11.0109**

Fish and Shellfish

See Food Science and Technology

Fish Farming

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Aquaculture

Fish Food Supply

See Fish & Wildlife Biology
Fish & Shellfish Biology

Fish Product Development

THE DEVELOPMENT OF TRADITIONAL FISH PROCESSING ... Fermentation; Osteichthyes -other; Shelf Life & Storage of Food; ...**3.0074**

TECHNOLOGY OF NATURAL RUBBER - MASTER-MIXTURES BASED ON LOCAL PRODUCTS ... Casein; Fillers, Extenders; Latex; Quality and Utilization; Rubber -natural; ...**4.0256**

Fishing Methods and Equipment

See Fish & Wildlife Biology
Aquaculture

Fishmeal

See Feed Science and Technology
By-products- Animal

Flacourtiaceae

See Plants - Dicots

Flood Irrigation

See Irrigation

Floods

See Water Movement

Floras

See Ecology, Plant

Flotation

See Chemistry -related Fields

Flow Characteristics -water

See Water Movement
Hydraulics

Fluorine

STUDY FORMS OF PHOSPHATE FERTILIZERS FOR THE COCONUT PALM ... Calcium; Cocos; Fertilizer Toxicity; Formulation, Fertilizer; Management; Phosphates; ...**4.0321**

Fluvisols

See Soil Unit Classification

Foam Fractionation

See Chemistry -related Fields

Foliage Diseases -nonspecific

See Plant Diseases

Foliar Application

See Application Methods

Fomes

See Fungi

Food Additives

See Food Science and Technology

Food Distribution Research
See Ag Industries & Agribusiness

Food Engineering & Technology
See Food Science and Technology

Food Processing Wastes
See Utilization of Ag Wastes
See Waste Treatment/Disposal

Food Proteins
See Food Science and Technology

Food Quality
See Food Science and Technology

Food Science and Technology

THE USE OF INDUSTRIAL BY-PRODUCTS IN SHEEP AND GOAT RATIONS ... Bran; Consumption; In Vivo--see Also Feed Rations; Management; Molasses; Service Industries; ... **9.0033**

STUDY OF MARKET STRUCTURE AND ORGANIZATION WITH SPECIAL REFERENCE TO THE BUYING ARRANGEMENTS OF FOOD CONTRACTORS FOR INSTITUTIONS ... Consumption; Food Distribution Research; Institutional Management; Market Structure; Service Industries; ...**9.0034**

Alcoholic Beverages

Beer

MALT PRODUCTION FROM LOCAL GRAINS ... Cereal Crops; Enzyme Kinetics; Hordeum Vulgare; Malting Food; Sorghum Vulgare (Grain); ...**9.0057**

Wine

PRODUCTION OF WINES FROM LOCAL FRUITS AND VEGETABLES ... Fermentation; Food Processing Wastes; Food Yeast; Fruits; Vegetable & Vegetable Products; ...**3.0076**

CROP UTILIZATION PROJECT ... By-products- Plant(Vegetative); Chocolate & Cocoa; Compost; Food Processing Wastes; Nuts & Nutmeats; Preserves & Jelly; ...**9.0154**

SUGAR CONTENT OF PALM SAP ... Carbohydrates; Fermentation; Food Quality; Palmae; Sugar -nonspecific; ...**9.0319**

FERMENTATION OF PALM WINE ... Fermentation; Food Additives; Palmae; Shelf Life & Storage of Food; Temperature Control; ...**9.0320**

THE MARKET FOR PALM WINE IN NIGERIA ... Consumer Pref. & Consumption; Food Distribution Research; Marketing; Palmae -other; ...**9.0333**

Baby Foods

DEVELOPMENT OF WEANING FOODS FROM VEGETABLE PROTEIN SOURCES ... Food Proteins; Malnutrition; Nuts & Nutmeats; Therapeutic Nutrition; Treatment; ...**3.0075**

Beverages -other

INDUSTRIAL TRANSFORMATION OF FRUITS ... Essential Oils; Fats & Oils; Food Processing Wastes; Fruits; ...**6.0003**

Cereal Products

THE DEVELOPMENT OF SEMI-FINISHED, FERMENTED, AND DEHYDRATED MAIZE MEAL ... Dehydration; Fermentation; Organic Acids; Organoleptic Studies of Food; Spoilage of Food; ...**3.0079**

FOOD COMPOSITION TABLES ... Catalogs, Tables, Compilations; Chemical Analysis of Food; Dairy Products; Fruits; Nuts & Nutmeats; Vegetable & Vegetable Products; ...**3.0080**

MOISTURE CONTENT - RELATIVE HUMIDITY EQUILIBRIA OF SOME GHANAIAN FOODSTUFFS ... Drying; Manihot; Piperaceae; ...**3.0214**

EXPERIMENTAL CULTIVATION OF COTTON-PLANTS WITHOUT GOSSYPOL ... Breeding & Genetics; Gossypol; Insect Resistance; ...**6.0006**

DEVELOPMENT OF COMPOSITE FLOUR FROM NIGERIAN FOODS ... Baking Food; Cereal Product Development; Costs; New and Unconventional Foods; ...**9.0059**

COMMERCIAL PRODUCTION OF SOY-OGI AND GARI ... Child Developmental Stages; Food Proteins; Nutritive Value of Food; ...**9.0060**

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ... **9.0177**

TO COMPARE THE NUTRIENT CONTENT OF PARBOILED RICE THROUGH VARIOUS STAGES OF PROCESSING ... Cooked Quality of Food; Food Proteins; Nutritive Value of Food; Proteins; ...**9.0202**

PRODUCTION OF WHITE FLOURY MAIZE VARIETIES FOR HUMAN CONSUMPTION ... Breeding & Genetics; Cereal Product Development; Continuous Humid 7 Months,Plus; Metabolic Expression; Organoleptic Studies of Food; Recurrent Selection; ...**9.0232**

PHYSICO-CHEMICAL AND BIOCHEMICAL STUDIES ON THE STARCH AND PROTEIN OF RICE ... Child Developmental Stages; Ligase; Nitrates; Proteins; Starch; ...**10.0009**

RESEARCH ON WHEAT AND BARLEY ... Baking Food; Hordeum Vulgare; Irrigation; Management; Triticum; ...**11.0006**

INTRODUCTION OF NEW VARIETIES OF RICE FOR THE FRESH-WATER RICE FIELDS OF CASAMANCE ... Disease Resistance; Humid 2 Months; Phytopathology; Piricularia; Piriculariosis; Soil pH; ...**11.0124**

INTRODUCTION OF NEW VARIETIES OF PLUVIAL RICE ... Disease Resistance; Drought Resistance; Humid 2 Months; Phytopathology; Piricularia; Piriculariosis; ...**11.0125**

VARIETAL IMPROVEMENT OF RICE BY HYBRIDATION FOR THE IMPROVED FRESH-WATER RICE FIELDS OF CASAMANCE ... Breeding & Genetics; Disease Resistance; Phytopathology; Piriculariosis; Soil Resistance; ...**11.0126**

VARIETAL IMPROVEMENT OF RICE BY HYBRIDIZATION FOR THE SALT-WATER RICE-FIELDS OF LOWER CASAMANCE ... Breeding & Genetics; Humid 2 Months; Saline Soils; Soil Resistance; ...**11.0127**

VARIETAL IMPROVEMENT OF PLUVIAL RICE BY HYBRIDATION ... Breeding & Genetics; Disease Resistance; Humid 2 Months; Piricularia; ...**11.0128**

MULTIPLICATION OF A GLANDLESS VARIETY OF COTTON PLANT ... Breeding & Genetics; Cereal Product Development; Enrichment; Food Proteins; ...**11.0159**

PRODUCTION OF COTTON HAVING SEEDS FREE FROM GOSSYPOL ... Breeding & Genetics; Food Proteins; Gossypol; Metabolic Expression; Proteins; ...**13.0039**

Coffee

INDUSTRIAL PROCESSING OF COFFEE ... Beverage Crops; Food Engineering & Technology; Plant Industries -other; Processing of Food; ...**4.0031**

Dairy Products

FOOD COMPOSITION TABLES ... Catalogs, Tables, Compilations; Chemical Analysis of Food; Fruits; Nuts & Nutmeats; Vegetable & Vegetable Products; ...**3.0080**

Dietetic Foods

Low Fat Foods

CROP UTILIZATION PROJECT ... By-products- Plant(Vegetative); Chocolate & Cocoa; Compost; Food Processing Wastes; Nuts & Nutmeats; Preserves & Jelly; ...**9.0154**

Fats & Oils

STUDY OF THE ADAPTATION OF CITRUS FRUIT TREES IN THE DIFFERENT CLIMATIC ZONES OF THE IVORY COAST ... Breeding & Genetics; Climate- Continental Sav.-Trop.; Fruits and Berries; Quality and Utilization; ...**4.0156**

INDUSTRIAL TRANSFORMATION OF FRUITS ... Beverages -other; Essential Oils; Food Processing Wastes; Fruits; ...**6.0003**

LIQUID AND SOLID COMPONENTS OF PALM OIL ... Fats - Lipids & Oils; Food Quality; Fruits; Oilseed Crops; Temperature Control; ...**9.0321**

Fish and Shellfish

THE DEVELOPMENT OF TRADITIONAL FISH PROCESSING ... Fermentation; Fish Product Development; Osteichthyes -other; Shelf Life & Storage of Food; ...**3.0074**

Food Yeast

Fruits

Meats and Meat Products

New and Unconventional Foods

Nuts & Nutmeats

Preserves & Jelly

Processing of Food

Baking Food

Culturing Food

Dehydration

Drying

Enrichment

Fermentation

ORIGINS OF MOULD ATTACK ON STORED COCOA BEANS ... Chocolate & Cocoa; Molds; Spoilage of Food; ... **9.0335**

Freezing

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BIOLOGICAL PROBLEMS IN THE IMPROVEMENT OF PANICUM MAXIMUM ... Breeding & Genetics; Interspecific Cross; Parthenocarpy; ...**4.0054**

INHERITANCE STUDIES IN COWPEA (VIGNA VINGUICULATA) ... Breeding & Genetics; Colletotrichum; Fungal Resistance; Recessive Trait; ...**9.0039**

PRODUCTION OF WHITE FLOURY MAIZE VARIETIES FOR HUMAN CONSUMPTION ... Breeding & Genetics; Cereal Product Development; Cereal Products; Continuous Humid 7 Months,Plus; Organoleptic Studies of Food; Recurrent Selection; ...**9.0232**

RECURRENT SELECTION IN A NIGERIAN WHITE FLOURY COMPOSITE ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Recurrent Selection; Selfing; Synthetic Varieties & Blends; ...**9.0236**

PRODUCTION OF COTTON HAVING SEEDS FREE FROM GOSSYPOL ... Breeding & Genetics; Cereal Products; Food Proteins; Gossypol; Proteins; ...**13.0039**

Mutation

GENETICS OF COWPEA - VIGNA UNGUICULATA ... Breeding & Genetics; Electrophoresis; ...**3.0060**

TOMATO BREEDING ... Breeding & Genetics; Cobalt; Continuous Humid 7 Months,Plus; Disease Resistance; Lycopersicum; ...**3.0150**

PLANT EXPLORATION AND COLLECTION ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Cyclamate; Plant Parts Bank; Plant Resistance; Sugar -nonspecific; ...**3.0209**

IMPROVEMENT OF HEVEA BRASILIENSIS - THE OBTAINING OF POLYPLOIDS ... Breeding & Genetics; Two Humid Seasons; ...**4.0234**

SELECTION OF LATE VARIETIES OF FLOATING RICE AFTER IRRADIATION ... Breeding & Genetics; Harvest and Storage; Management; Moisture Deficiency; Non-dry 3 Months, Plus; ...**6.0057**

USE OF RADIATION FOR THE IMPROVEMENT OF FUNGAL STRAINS AS THE NUTRITIONAL ADDITIVE IN THE CARBOHYDRATE RICH ROOT CROPS OF NIGERIA ... Culturing Food; Food Proteins; Management; Starch; ...**9.0024**

MUTATION BREEDING IN CACAO AND KOLA ... Black Pod; Breeding & Genetics, Spice&Bev; Cola; Fungal Resistance; Phytophthora; ...**9.0114**

SHORTENING THE STRAW OF A LOCAL VARIETY OF SORGHUM BY PROVOKING MUTATIONS ... Breeding & Genetics; Ferric Luvisols; Humid 3 Months; Sorghum Vulgare (Grain); ...**14.0032**

IMPROVEMENT OF AQUATIC RICE BY MUTAGENESIS ... Breeding & Genetics; Eutric Gleysols; Humid 4 Months; Piriculariosis; ...**14.0045**

Phenotypes

IDOLATRICA CHARACTER (OIL PALM) ... Breeding & Genetics; Hybrid Breeding -nonspecific; Plant Morphology; ...**9.0287**

SHORT-STEMMED OIL PALM ... Breeding & Genetics; Intergeneric Cross; Palmae -other; ...**9.0291**

Population Genetic Relations

OIL PALM - STUDY THE CHARACTERS AND THE FERTILITY OF THE HYBRID E. MELANOCOCCA X E. GUINEENSIS ... Cercospora; Endodermis; Interspecific Cross; Tannin; Two Humid Seasons; ...**4.0287**

IMPROVEMENT OF THE LOCAL VARIETIES OF MAIZE BY PRODUCTION OF SYNTHETIC VARIETIES ... Breeding & Genetics; Ferric Luvisols; Heterosis; Humid 4 Months; Synthetic Varieties & Blends; ...**14.0046**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES ... Bacterial Resistance; Eutric Gleysols; Hybrid Breeding -nonspecific; Pseudomonas - nonspecific; ...**14.0053**

Geologic Time

Cenozoic Era

Quaternary Period

EVOLUTION OF FERRALYTIC LANDSCAPES IN AN EQUATORIAL AND TROPICAL CLIMATE - ALTERATION, EROSION, RECASTING, HARDENING ... Climate-Humid Equatorial; Geology; Soil Analysis; Soil Crusts; Tertiary Period; ...**4.0038**

CARTOGRAPHY AT 1/200,000 OF THE SOILS OF THE BASSARI DISTRICT ... Geology; Sedimentology; Soil Morphology, Profiles; Soil Survey; Soil Types; Topographical Parameters-other; ...**13.0012**

Tertiary Period

EVOLUTION OF FERRALYTIC LANDSCAPES IN AN EQUATORIAL AND TROPICAL CLIMATE - ALTERATION, EROSION, RECASTING, HARDENING ... Climate-Humid Equatorial; Geology; Soil Analysis; Soil Crusts; ...**4.0038**

Geology

DETAILED RECONNAISSANCE SOIL SURVEY OF UPPER AFRAM BASIN ... Mineralogy; Soil Physical Properties; Soil Survey; ...**3.0220**

DETAILED RECONNAISSANCE SOIL SURVEY OF CAPE COAST REGION, CENTRAL AND WESTERN REGION OF GHANA ... Land Use -agriculture; Roads and Highways; Soil Morphology, Profiles; Soil Physical Properties; Soil Survey; Transportation; ...**3.0222**

DETAILED RECONNAISSANCE SOIL SURVEY OF THE LOWER AFRAM BASIN ... Mineralogy; Soil Morphology, Profiles; Soil Physical Properties; Soil Survey; ...**3.0223**

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Ferric Acrisols; Growth Stage of Plant; Management; Nursery Observational Plots; Soil Types; ...**4.0001**

MINERAL FERTILIZATION OF COFFEE ... Ferralic Cambisols; Management; Soil Types; ...**4.0006**

OPERATION OF RESEARCH IN GEODYNAMICS, GEOCHEMISTRY AND GEOMORPHOLOGY IN THE IVORY COAST ... Infiltration; Soil Crusts; Soil Morphology, Profiles; ...**4.0036**

EVOLUTION OF FERRALYTIC LANDSCAPES IN AN EQUATORIAL AND TROPICAL CLIMATE - ALTERATION, EROSION, RECASTING, HARDENING ... Climate-Humid Equatorial; Soil Analysis; Soil Crusts; Tertiary Period; ...**4.0038**

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Eutric Fluvisols; Growth Stage of Plant; Management; Nursery Observational Plots; Soil Types; ...**4.0089**

MINERAL FERTILIZATION ON COFFEE ... Ferric Acrisols; Growth Stage of Plant; Management; Nursery Observational Plots; Soil Types; Two Humid Seasons-7 Month,Plus; ...**4.0112**

MINERAL FERTILIZATION ON COFFEE ... Ferralic Arenosols; Growth Stage of Plant; Management; Nursery Observational Plots; Soil Types; Two Humid Seasons; ...**4.0145**

MINERAL FERTILIZATION ON COFFEE ... Ferric Acrisols; Growth Stage of Plant; Management; Nursery Observational Plots; Soil Types; Two Humid Seasons-7 Month,Plus; ...**4.0331**

RELATIONS BETWEEN SOIL AND GROWTH FOR PRINCIPAL SPECIES FOR FORESTRY PLANTATIONS ... Ecosystems; Silviculture; Soil Types; Tectona; ...**4.0344**

GENESIS OF SOME REPRESENTATIVE SOILS OF THE DESIRED SAVANNA REGION ... Soil Analysis; Soil Genesis; Soil Morphology, Profiles; Soil Physical Properties; Soil Profile Studies; Soil Types; ...**9.0055**

INVESTIGATION OF THE INFLUENCE OF CLIMATE ON SOIL MORPHOLOGY AND SOIL DISTRIBUTION IN THE METAMORPHIC REGIONS OF NIGERIA ... Soil Genesis; Soil Morphology, Profiles; Soil Profile Studies; Soil Types; ...**9.0056**

STUDY OF THE SOILS DEVELOPED ON THE CRYSTALLOPHYLLIAN BASE OF TOGO - CARTOGRAPHY AT 1/200,000TH OF THE SOUTHERN PART ... Sedimentology; Soil Morphology, Profiles; Soil Survey; Soil Types; ...**13.0011**

CARTOGRAPHY AT 1/200,000 OF THE SOILS OF THE BASSARI DISTRICT ... Quaternary Period; Sedimentology; Soil Morphology, Profiles; Soil Survey; Soil Types; Topographical Parameters-other; ...**13.0012**

CARTOGRAPHY OF THE AGRARIAN ACTIVITIES OF TOGO ... Remote Sensing; Soil Survey; Topographical Parameters-other; ...**13.0014**

RECONNAISSANCE AND EVALUATION OF THE SOILS OF TOGO ... Soil Survey; ...**13.0016**

STUDY OF THE MINERAL DEFICIENCIES OF THE SOILS OF TOGO AND THEIR EVOLUTION ... Deficiencies; Management; Movement, Availability; Sulfur; ...**13.0041**

Germination

See Seed

Gibbsite

See Mineralogy

Gleyic Acrisols

See Soil Unit Classification

Acrisols

Gleyic Luvisols

See Soil Unit Classification

Luvisols

Gleysols

See Soil Unit Classification

Gliadin

See Proteins

Globulins

See Proteins

Gloeosporium

See Fungi

Glucose

See Carbohydrates

Glutamic Acid

See Amino Acids

Glutamine

See Amino Acids

Glutelin

See Proteins

Glycine -other

See Plants - Dicots

Leguminosae

Glycine Max

See Plants - Dicots

Leguminosae

Glycoside -general

See Carbohydrates

EVOLUTION OF THE SOILS OF BANANA PLANTATIONS. CULTIVATION IN ORGANIC SOILS ... Env. Plant Dis. Relation; Musa; Orthic Acrisols; Soil - Alkaline; Soil Drainage; ... **4.0153**

INTEGRATED CONTROL OF THE PARASITES AND MARAUDERS OF THE BANANA PLANT ... Cladosporium; Fungicides -nonspecific; Nematocides; Systemic Action (Plant); ...**4.0154**

STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Management; Passiflora; Phytophthora; ...**4.0155**

STUDY OF THE ADAPTATION OF CITRUS FRUIT TREES IN THE DIFFERENT CLIMATIC ZONES OF THE IVORY COAST ... Breeding & Genetics; Climate- Continental Sav.-Trop.; Fats & Oils; Fruits and Berries; Quality and Utilization; ... **4.0156**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ... **8.0024**

Leafy & Fruit-type Vegetables

Breeding & Genetics

TOMATO BREEDING ... Cobalt; Continuous Humid 7 Months,-Plus; Disease Resistance; Lycopersicum; Mutation; ...**3.0150**

PEPPER IMPROVEMENT ... Capsicum; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Ferric Luvisols; Synthetic Varieties & Blends; ...**9.0163**

LEAFLY AND FRUIT VEGETABLE IMPROVEMENT ... Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Ferric Luvisols; Lycopersicum; Synthetic Varieties & Blends; ...**9.0164**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES ... Bacterial Resistance; Eutric Gleysols; Hybrid Breeding -nonspecific; Pedigree; Pseudomonas -nonspecific; ...**14.0053**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES (2) ... Bacterial Resistance; Fruit Rot; Lycopersicum; Phytopathology; ...**14.0054**

Management

VEGETABLE VARIETY TRIALS FOR CANNING OR BLAST FREEZING ... Crop Rotation, Cropping System; Freezing; Lycopersicum; Phaseolus; Vegetable & Vegetable Products; ... **2.0006**

COMPOSTING OF SAWDUST ... C/N Ratio; Compost; Lycopersicum; Organic Soils; Sawdust Utilization; ...**3.0100**

TOMATO VARIETY TRIAL ... Continuous Humid 7 Months,-Plus; Lycopersicum; Rain; Timing of Planting Procedures; ... **3.0149**

TOMATO - COWPEA ROTATION ... Continuous Humid 7 Months,Plus; Crop Rotation, Cropping System; Lycopersicum; Plant Nematodes -nonspecific; ...**3.0151**

ADAPTION TRIAL ON VEGETABLE CROPS ... Brassica Oleracea; Cucurbita; Lactuca; Sprinkler Irrigation; ...**7.0005**

INCORPORATION OF LEAFLY AND FRUIT VEGETABLE AND PEPPER PRODUCTION INTO FARMING SYSTEMS ... Capsicum; Continuous Humid 7 Months,Plus; Ferralic Cambisols; Ferric Luvisols; Lycopersicum; Plant Industries -other; ... **9.0165**

BEHAVIOUR STUDY WITH VARIETIES OF EGGPLANT ... Hot Equatorial or Hot Tropical; Solanum; ...**11.0049**

UTILIZATION OF OLEAGINOUS ANNUALS ON IRRIGATED PERIMETERS ... Glycine Max; Irrigation -general; Lycopersicum; Multiple Cropping; Sesamum; ...**14.0011**

VERIFICATION OF TECHNIQUE IN RURAL ENVIRONMENT IN PILOT CULTIVATIONS ... Cajanus; Fallowing; Sesamum; Solanum; ...**14.0013**

Phytopathology

INVESTIGATION INTO THE BIOLOGY AND CONTROL OF ROOT-KNOT NEMATODES ON SOME CROPS ... Continuous Humid 7 Months,Plus; Culturing Techniques; DD; Nemagon; Nicotiana; Population Dynamics; ...**3.0128**

STUDY OF THE PARASITIC FUNGI OF MARSHLAND CROPS - ANNUAL AND GEOGRAPHICAL VARIATION OF THE MYCOFLORA ... Fungal Resistance; Hyphomycetes; Marsh; Surveys; ...**4.0066**

IDENTIFICATION OF VIRUSES OF MARKET GARDENING PLANTS IN THE IVORY COAST - GOMBO (OKRA), PASSION-FRUIT AND PEPPER ... Capsicum; Mosaic Viruses; Passiflora; Plant Virus -general; Vectors; Viral Transmission; ... **4.0077**

STUDIES ON THE BACTERIAL WILTS OF SOLANACEOUS VEGETABLES ... Bacterial Wilt; Pseudomonas -nonspecific; Solanaceae -other; Virulence and Pathogenicity; ...**9.0221**

NEMATODES OF VEGETABLES ... Capsicum; DD; Lycopersicum; Nemagon; Nematode Resistance; Tylenchoidea; ... **9.0265**

SURVEY OF THE DISEASES OF THE IMPORTANT VEGETABLES IN NIGERIA ... Bacteria; Fungi; Surveys; ...**9.0282**

STUDY OF VARIETIES OF TOMATO RESISTANT TO NEMATODES ... Lycopersicum; Nematode Resistance; Soil Environment; Surveys; Tylenchoidea; ...**11.0046**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES ... Bacterial Resistance; Eutric Gleysols; Hybrid Breeding -nonspecific; Pedigree; Pseudomonas -nonspecific; ...**14.0053**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES (2) ... Bacterial Resistance; Fruit Rot; Lycopersicum; ...**14.0054**

Nut Crops

Breeding & Genetics

SELECTION AND BREEDING OF CASHEW FOR HIGH YIELD AND DESIRABLE NUT CHARACTERISTICS ... Top Cross; ...**9.0150**

Management

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0011**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Passiflora; Plant Virus -general; Sapotaceae; ...**1.0071**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid 1 Month; Mangifera; Passiflora; ...**7.0006**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Passiflora; Plant Virus -general; Soil Moisture; ...**8.0024**

ROOT STUDIES ON COCOA, CASHEW AND KOLA ... Cola; Soil Environment -other; ...**9.0125**

MINERAL NUTRITION OF CASHEW ... Deficiencies; Fertilizer Toxicity; ...**9.0151**

CULTIVATION OF GROUNDNUTS IN ANACARDIUM (CASHEW NUT) PLANTATION DURING THE FIRST FEW YEARS OF DEVELOPMENT OF THE TREE ... Costs; Intercropping; Sesamum; ...**14.0010**

Root Crops

STUDY OF THE PHYSIOLOGICAL MECHANISM OF TUBER FORMATION IN A TROPICAL ENVIRONMENT ... Deficiencies; Dormancy; Growth and Differentiation; Orchidaceae; Photoperiod; Thermoperiod; ...**4.0049**

SINGLE CELL PROTEIN PRODUCTION FROM CASSAVA WASTES ... Candida; Food Processing Wastes; Fruits; Microorganism Utilization; Organoleptic Studies of Food; Yeasts -nonspecific; ...**9.0058**

THE ESTIMATION OF STARCH, DRY MATTER CONTENT AND HYDROGEN CYANIDE CONTENTS OF CASSAVA VARIETIES ... Chemical Analysis of Food; Fruits; Hydrogen Cyanide; Manihot; Organic Acids; Starch; ...**9.0213**

Breeding & Genetics

POTATO (SOLANUM TUBEROSUM) BREEDING PROJECT ... Intraspec. Genetic Relations; Management; Solanum; ... **2.0003**

ONION IMPROVEMENT ... Short Day; Storage Changes; ... **2.0004**

COLLECTION AND CLASSIFICATION OF YAM CULTIVARS ... Genetics; Plant Morphology; Plant Parts Bank; ... **3.0159**

CYTOLOGY OF YAMS ... Histology and Cytology; Management; ...**3.0160**

VARIETAL COLLECTION OF YAMS ... Continuous Humid; Intraspec. Genetic Relations; Plant Parts Bank; ...**4.0178**

Harvest and Storage

Management

Phytopathology

CASSAVA PATHOLOGY ... Bacterial Resistance; Breeding & Genetics; Diseases; Environments, Plant; Ferric Luvisols; Mosaic Viruses; Vectors; ...**9.0190**

SWEET POTATO PATHOLOGY ... Breeding & Genetics; Ferric Luvisols; Plant Parts Bank; Root Rot; ...**9.0191**

YAMS PATHOLOGY ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferric Luvisols; Plant Nematodes -nonspecific; Shoe String; Storage Rot; ...**9.0192**

THE PRODUCTION OF MOSAIC RESISTANT/TOLERANT, HIGH YIELDING CONSUMER ACCEPTABLE CASSAVA VARIETIES ... Breeding & Genetics; Manihot; Pedigree; Virus Resistance; ...**9.0212**

STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA) ... Bacterial Wilt; Insecta; Manihot; Taxonomy, Plant; Vectors; Xanthomonas; ...**9.0220**

STUDIES ON THE BACTERIAL WILTS OF SOLANACEOUS VEGETABLES ... Bacterial Wilt; Pseudomonas -nonspecific; Solanaceae -other; Virulence and Pathogenicity; ...**9.0221**

INVESTIGATION INTO THE CAUSES OF YAM-TUBER ROTS ... Harvest and Storage; Mineralogy; Nutrition in Disease; Storage Rot; Taxonomy, Plant; Tuber Rot; ...**9.0247**

DETERMINATION OF THE MODE OF FUNGICIDAL YAM TUBER PROTECTION ... Benlate; Captan; Plant Pathogenetic Fungi; Storage Rot; Tuber Rot; TBZ; ...**9.0248**

CONROL OF YAM STORAGE ROTS ... Benlate; Captan; Harvest and Storage; Storage Rot; Tuber Rot; TBZ; ...**9.0249**

SURVEY OF THE DISEASES OF THE IMPORTANT VEGETABLES IN NIGERIA ... Bacteria; Fungi; Surveys; ...**9.0282**

Vegetables -other

IMPROVEMENT OF THE CROPPING TECHNIQUES IN TRADITIONAL AGRICULTURE ... Farm Enterprises -general; Humid 4 Months; Management; Production and Processing; Rain; ...**6.0035**

RESEARCH AND DEVELOPMENT IN GENERAL HORTICULTURE, ESPECIALLY FRUITS AND VEGETABLES ... Fruits and Berries; Vine,Shrub, Bramble Fruit Crop; ...**9.0267**

PLANT PHYSIOLOGY ... Fruits and Berries; Vitamins; ...**12.0003**

Vine,Shrub, Bramble Fruit Crop

RESEARCH AND DEVELOPMENT IN GENERAL HORTICULTURE, ESPECIALLY FRUITS AND VEGETABLES ... Fruits and Berries; Vegetables -other; ...**9.0267**

Harvest and Storage

THE DESIGN, TESTING AND DEVELOPMENT OF A MACHINE FOR SHELLING MELON SEEDS AND EXTRACTING MELON SEED OIL ... Crop Production, Harvesting; Cucumis; Design,Modify,Develop.of Equip; Fats - Lipids & Oils; ...**9.0054**

Management

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Eutric Fluvisols; Humid 4 Months; Mangifera; Passiflora; Psidium; ...**6.0004**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid 1 Month; Mangifera; Passiflora; ...**7.0006**

INVESTIGATION AND IMPROVEMENT OF NIGERIAN SEED MELON PRODUCTION ... Cucumis; Placement; Timing of Planting Procedures; ...**9.0045**

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Plant Pathogenetic Fungi; Root Rot; Space Competition; Terminalia; ...**9.0086**

Phytopathology

TO SCREEN SULPHUR-FREE FUNGICIDES FOR EFFECTIVENESS IN CONTROLLING MILDEWS IN CUCURBITS ... Cucurbita; Fungicides -nonspecific; Mildew Diseases; Phytotoxicity; Sulfur; ...**9.0283**

Horticulture Insects on

See Entomology, Applied

Host Preference, Host-insect

See Entomology, Applied

Humic Gleysols

See Soil Unit Classification

Gleysols

Humidity

See Environments, Animal

See Environments, Plant

See Meteorology

Hybrid Breeding -nonspecific

See Genetics

Genetic & Breeding Methods

Hydraulics

See Water Movement

Hydrogen Cyanide

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Nutritive Value of Food; Pulse Crops; Tryptophane; ...**9.0177**

CASSAVA BREEDING ... Bacterial Wilt; Cercospora; Disease Resistance; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Phytopathology; ...**9.0182**

THE ESTIMATION OF STARCH, DRY MATTER CONTENT AND HYDROGEN CYANIDE CONTENTS OF CASSAVA VARIETIES ... Chemical Analysis of Food; Fruits; Manihot; Organic Acids; Root Crops; Starch; ...**9.0213**

Hydrolytic Enzymes -general

See Enzymes

Hydroponic Studies

See Environments, Plant

Hygromas Bursitis

See Animal Pathology

Hymenoptera

See Insecta

Hyphomycetes

See Fungi

IBA

See Pesticides

Plant Growth Regulators

Ichneumonidae

See Insecta

Hymenoptera

Immunity

IMMUNE RESPONSE TO NEWCASTLE DISEASE VACCINES ... Chicken, Domestic; Evaluation, Efficacy; Globulins; Hemagglutination Inhibition; Newcastle Disease; Viral Vaccines; ...**3.0024**

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Rinderpest; Veterinary Medicine; ...**8.0004**

CONTROL OF PNEUMONIA-ENTERITIS COMPLEX IN GOATS BY USE OF "PEC" TISSUE VACCINE ... Blood and Lymph System; Pneumonia; Sheep Husbandry; Vaccines; Veterinary Medicine; ...**9.0019**

RINDERPEST PROPHYLAXIS - ESTABLISHMENT OF A THERMO-RESISTANT VACCINE ... Prophylaxis; Pseudomyxoviruses; Rinderpest; Veterinary Medicine; Viral Vaccines; ...**11.0096**

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Pathology -mammal; Serology; Veterinary Medicine; ...**11.0099**

BOVINE PLEUROPNEUMONIA - ESTABLISHMENT OF A FREEZE-DRIED, HEAT-RESISTANT VACCINE ... Bacterial Vaccine; Freeze-dry Techniques; Pneumonia; Thiosulfates; Veterinary Medicine; ...**11.0103**

BOVINE PLEUROPNEUMONIA - PATHOGENESIS ... Bacterial Toxins; Bovine Pleuropneumonia; Pleuropneumonia Group; Veterinary Medicine; ...**11.0106**

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**11.0113**

AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT ... Fowl Pox; Newcastle Disease; Salmonella; Veterinary Medicine; ...**11.0115**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - VACCINE 9 R AGAINST FOWL TYPHOID AND PULLORUM DISEASE ... Globulins; Poultry -nonspecific; Vaccines; ... **11.0116**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE ... Fowl Cholera; Fowl Typhoid Pullorum Disease; Myxoviruses, True; Poultry -nonspecific; Salmonella; Veterinary Medicine; ... **11.0117**

Immunology

See Vertebrate Physiology

Income Analysis

See Economics

Indeterminate

See Environments, Plant

Photoperiod

Indicator Organisms

REDUCTION OF SUGARCANE MOSAIC VIRUS ... Detection & Diagnosis; Mosaic Viruses; Phytopathology; ...**9.0245**

Industrial & New Crops

See Agronomy

Industrial Operation

See Chemistry -related Fields

Industrial Use of Invertebrate

PRODUCTION OF SILK IN NIGERIA ... Insect Utilization; Rearing of Insects; Saturniidae; ...**9.0260**

Industrial, Structural Insects

See Entomology, Applied

Infestation of Food

See Food Science and Technology

Food Quality

Infiltration

See Water Movement

Information Centers & Services

CLASSIFICATION AND DISTRIBUTION OF MOIST FOREST VEGETATION TYPES ... Floras; Mapping; Silviculture; ...**9.0083**

Injection

See Application Methods

Inoculation

FUSARIOSIS OF THE OIL PALM TREE - SELECTION OF RESISTANT MATERIAL ... Env. Plant Dis. Relation; Fungal Resistance; Fusarium; Nursery Observational Plots; Phytopathology; Selfing; ...**4.0095**

CERCOSPORIOSIS OF THE OIL PALM TREE ... Cercospora; Fungicides -nonspecific; Phytopathology; Systemic Application; ...**4.0097**

CHEMICAL CONTROL MEASURES AGAINST PIRICULARIA ORYZAE ... Continuous Humid; Phytopathology; Piriculariosis; ...**4.0190**

RESEARCH IN CULTIVATED RICE FOR SIRES HAVING HORIZONTAL RESISTANCE TO PIRICULARIOSIS ... Breeding & Genetics; Continuous Humid; Fungal Resistance; Phytopathology; Piricularia; Piriculariosis; ...**4.0192**

ANALYSIS OF THE RELATIVE INCIDENCE OF STRAINS OF PIRICULARIA ORYZAE IN RICE-FIELDS ... Continuous Humid; Env. Plant Dis. Relation; Phytopathology; Piricularia; Piriculariosis; ...**4.0193**

STUDY OF INOCULATIONS OF RHIZOBIUM ON SOYA ... Continuous Humid; Nitrogen Fixation; Rhizobium; Soil Microbiology; ...**4.0198**

STUDY THE RESISTANCE OF THE COCONUT PALM TO HELMINTHOSPORIOSIS ... Breeding & Genetics; Fungal Resistance; Phytopathology; Selfing; ...**4.0328**

IMPROVEMENT OF VARIETIES OF HIBISCUS CANNABINUS ... Breeding & Genetics; Disease Resistance; Phytopathology; ...**6.0084**

ESTABLISHMENT OF PINE MYCORRHIZAS ... Basidiomycetes; Mycorrhiza; Pinus; Silviculture; Symbionts, Plant Diseases; ...**9.0089**

BREEDING FOR BLACKPOD RESISTANCE IN CACAO ... Black Pod; Breeding & Genetics, Spice&Bev; Fungal Resistance; Intraspec. Genetic Relations; Phytopathology; Phytophthora; ... **9.0111**

BIOLOGICAL CONTROL OF THE BROWN LEAF SPOT DISEASE OF RICE USING ORGANISMS ANTAGONISTIC TO THE PATHOGEN ... Brown Spot; Helminthosporium; Phytopathology; Soil-borne; ...**9.0217**

A STUDY OF THE CONTRIBUTION OF FIXED NITROGEN TO THE NUTRITION OF COWPEA (VIGNA UNGUICULATA) ... Continuous Humid 7 Months,Plus; Nitrogen Fixation; Pulse Crops; Rhizobium; ...**9.0218**

SELECTION OF RICE VARIETIES FOR RESISTANCE TO THE RICE BLAST DISEASE (PYRICULARIA ORYZAE) ... Blast; Fungal Resistance; Phytopathology; Piricularia; Piriculariosis; ...**9.0239**

SELECTION OF BEAN VARIETIES RESISTANT TO BEAN VIRUSES IN THE FIELD ... Breeding & Genetics; Glycine Max; Plant Virus -general; Virus Resistance; ...**9.0244**

STUDIES ON THE HOST RANGE OF HELMINTHOSPORIUM ORYZAE ... Grass -nonspecific; Helminthosporium; Pathology of Weeds; ...**9.0278**

STUDIES ON THE HOST-PARASITE RELATIONS OF RICE AND HELMINTHOSPORIUM ORYZAE ... Cellular Physiology; Culturing Techniques; Helminthosporium; Phytopathology; ...**9.0285**

STUDIES ON THE OIL PALM PATCH YELLOWS ... Fungal Resistance; Fusarium; Phytopathology; Yellows; ...**9.0322**

THE CONTROL OF THE OIL PALM DRY BASAL ROT DISEASE ... Basal Rot; Ceratocystis; Phytopathology; ...**9.0323**

CONTROL OF THE OIL PALM VASCULAR WILT DISEASE ... Fungal Resistance; Fusarium; Fusarium Wilt; Phytopathology; Soil-borne; ...**9.0324**

COMPARISON OF POTTING MIXTURES FOR NURSERY STOCK ... Dowfume Cpds.; Mycorrhiza; Nursery Observational Plots; Sand; Soil Potting Mixture; ...**9.0345**

INOCULATION OF SOYA BEAN SEEDS ... Glycine Max; Management; Rhizobium; ...**11.0030**

THE MOST FAVOURABLE CROPPING TECHNIQUES FOR THE NODULATION OF GROUNDNUTS ... Fats - Lipids & Oils; Lime; Management; Proteins; Yellow Dwarfing; ...**11.0031**

Inorganic Elements in Feeds

See Vertebrate Nutrition

Diet Components -animal

Insect Attractants

See Pest Control Measures

Insect Pheromones

See Pheromones & Sex Attractants

Insect Resistance

See Plant Resistance

Insect Utilization

See Entomology, Applied

Insect Viruses -other

See Viruses, Animal

Viruses of Insects

Insecta

STUDY OF THE PARASITISM OF THE COTTON PLANT ... Fiber Crops; Habitat Studies; Population Dynamics; ...**1.0045**

EXPERIMENTS TO CONFIRM THE EFFICACY OF INSECTICIDE PREPARATIONS IN COTTON PLANTATIONS ... Endrin; Peprothion; Phosvel; Thiodan; ...**1.0046**

TESTING OF NEW INSECTICIDE PREPARATIONS IN THE PROTECTION OF COTTON PLANTATIONS ... DDT; Fiber Crops; Peprothion; Phosvel; Thiodan; Zectran; ...**1.0047**

INSECTICIDE EVALUATION TEST IN COTTON PLANTATIONS OF MIXTURES OF PROVEN INSECTICIDAL PREPARATIONS ... Dystric Nitosols; Endrin; Gardona; Humid 6 M.or Less; Pesticides -other; Synergism and Synergists; ...**1.0049**

EXPERIMENT ON STARTING INSECTICIDAL TREATMENT OF THE COTTON PLANTS AT A WARNING SIGN ... Fiber Crops; Insecticides -nonspecific; Timing -other; ...**1.0050**

COTTON AGRONOMY ON THE BLACK SOILS, ACCRA PLAINS ... DDT; Formulation, Fertilizer; Preforan; Soil Moisture; Synergism and Synergists; ...**3.0005**

INSECT INFESTATION AND DAMAGE OF MAIZE AND COWPEAS ON SALE ON SOME MARKETS IN GHANA ... Cereal Crops; Grain Industries; Moisture Content -plants; Price and Value; ...**3.0210**

STUDY OF RICE PESTS ... Barriers & Weirs; Cereal Crops; Management; Rodentia -other; ...**5.0014**

CHEMICAL CONTROL OF THE INSECT PARASITES OF COTTON PLANTS IN MALI ... DDT; Endrin; Fiber Crops; Phosalone; Sequential, Daily, Weekly, Etc; ...**6.0080**

INSECTICIDE TREATMENT OF COTTON CROPS AFTER WARNING SIGNS ... Fiber Crops; Insecticides -nonspecific; Pests; ...**6.0083**

TESTING OF PREPARATIONS FOR PHYTOSANITARY PROTECTION ON COTTON ... DDT; Fiber Crops; Parathion; Synergism and Synergists; ...**8.0051**

VARIETAL RESISTANCE OF RICE TO THE MAJOR PESTS ... Breeding & Genetics; Insect Resistance; ...**9.0016**

SURVEY AND COLLECTION OF INSECT PESTS IN NURSERIES AND IN TREE PLANTATIONS IN NIGERIA ... Forestry Insects; Outbreaks of Insects; Surveys; Taxonomy, Plant; Teaching and Research; ...**9.0090**

INSECT PESTS ON FLOWERS, SEEDS AND SEEDLING OF FOREST TREES ... Forestry Insects; Khaya; Management; Quarantine &/or Inspection; Surveys; ...**9.0094**

STUDIES ON TREE CROP REHABILITATION ... Cola; Management; Phytopathology; Planting Methods -other; ...**9.0119**

THE COCOA SWOLLEN SHOOT VIRUS DISEASE PROJECT ... Beverage Crops; Pathology of Weeds; Population Dynamics; Swollen Shoot Virus; Virulence and Pathogenicity; ...**9.0129**

INSECTICIDE EVALUATIONS ON SOYBEANS - (GLYCINE MAX) ... Eutric Cambisols; Ferric Luvisols; Glycine Max; Insecticides -nonspecific; Oilseed Crops; Phytotoxicity; ...**9.0169**

GRAIN LEGUME ENTOMOLOGICAL INVESTIGATIONS ... Cajanus; Continuous Humid 7 Months,Plus; Ferric Luvisols; Oilseed Crops; Phaseolus; Surveys; ...**9.0170**

YAMS ENTOMOLOGY ... Ferralic Cambisols; Ferric Luvisols; Vegetables; ...**9.0189**

STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA) ... Bacterial Wilt; Manihot; Phytopathology; Taxonomy, Plant; Vectors; Xanthomonas; ...**9.0220**

CHEMICAL CONTROL OF INSECTS DESTRUCTIVE TO IRRIGATED RICE ... Cereal Crops; Economics of Chemical Control; Humid 2 Months; Insecticides -nonspecific; Irrigation -general; ...**11.0135**

STUDY OF THE POSSIBILITIES OF BIOLOGICAL CONTROL OF RICE PESTS ... Bacillus; Disease -biocontrol; Population Dynamics; Thuricide; ...**11.0136**

STUDY OF THE VARIETAL RESISTANCE OF RICE TO HARMFUL INSECTS ... Breeding & Genetics; Cereal Crops; Humid 2 Months; Insect Resistance; Seed Bank; ...**11.0137**

STUDY OF THE INSECTS THAT ARE HARMFUL TO RICE IN CASAMANCE ... Cereal Crops; Humid 2 Months; Light Traps; Population Dynamics; Rearing of Insects; Surveys; ...**11.0138**

STUDY THE PARASITIC FAUNA OF THE COTTON PLANT IN SENEGAL AND THE OPTIMAL NUMBER OF TREATMENTS ... Fiber Crops; Insecticides -nonspecific; Population Dynamics; Surveys; ...**11.0175**

EXPERIMENT ON INSECTICIDAL PROTECTION OF COTTON PLANTS ... DDT; Endrin; Fiber Crops; Hoe 2960; Peprothion; ...**13.0040**

VARIETAL EXPERIMENTS WITH COTTON ... Fiber Crops; Insecticides -nonspecific; Management; ...**14.0066**

TRIALS OF INSECTICIDE PREPARATIONS ON THE COTTON PLANT ... DDT; Endrin; Fiber Crops; Methyl Parathion; Thiodan; ...**14.0075**

VARIETAL EXPERIMENTS WITH COTTON ... Ferric Luvisols; Fiber Crops; Humid 6 Months; Insecticides -nonspecific; Management; Plinthic Luvisols; ...**14.0078**

TRIALS OF INSECTICIDE PREPARATIONS ON THE COTTON PLANT ... Endrin; Fiber Crops; Plinthic Luvisols; ...**14.0088**

EXPERIMENT ON THE FREQUENCY OF INSECTICIDAL SPRAYING OF THE COTTON CROP ... DDT; Endrin; Fiber Crops; Sequential, Daily, Weekly, Etc; ...**14.0089**

Coleoptera

THE INSECT PESTS OF THE OIL PALM IN NIGERIA ... Hemiptera; Lepidoptera; Oilseed Crops; Pests; Population Dynamics; Surveys; ...**9.0286**

THE INSECT PESTS OF THE COCONUT PALM IN NIGERIA ... Cocos; Hemiptera; Lepidoptera; Oilseed Crops; Pests; Surveys; ...**9.0309**

Bruchidae

A STUDY OF THE ECOLOGY, BIOLOGY, & CONTROL OF THE GROUNDNUT SEED BEETLE ... Biological Control; Host Preference, Host-insect; Insecticides -nonspecific; Oilseed Crops; ...**2.0007**

SUSCEPTIBILITY OF VARIETIES OF MAIZE AND COWPEAS TO PRIMARY STORAGE INSECT ATTACK ... Cereal Crops; Curculionidae; Insect Resistance; Pulse Crops; Stored Grain Insects; ...**3.0215**

Chrysomelideae

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

Coccinellidae

PROJECT ON ADAPTED CONTROL MEASURES AGAINST THE INSECT AND ACARID PESTS OF FRUIT CROPS ... Cambic Arenosols; Diaspididae; Insecticides -nonspecific; Population Dynamics; Rearing of Insects; Win. Tp Monsoon Desert; ...**7.0001**

Coleoptera -other

STUDIES ON AMBROSIA BEETLE POPULATIONS IN THE FOREST ZONES OF GHANA ... Forestry Insects; Population Dynamics; Scolytidae; Surveys; ...**3.0092**

TO SURVEY FIELD PESTS OF RICE IN NIGERIA ... Cereal Crops; Crambidae; Surveys; ...**9.0013**

SURVEY AND CONTROL OF INSECT PESTS ON TIMBER ... Forestry Insects; Taxonomy, Animal; ...**9.0091**

INSECTICIDAL CONTROL OF YAM BEETLE ... Timing of Application; Vegetables; ...**9.0262**

Curculionidae

STUDIES ON PESTS OF FOREST TREE SEEDS IN GHANA ... Digenea; Forestry Insects; Surveys; Terminalia; Triplochiton; ...**3.0094**

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Barriers & Weirs; Control of Nuisance Species;

DDVP; Phosphorothioate Cpds.; Storage; Tenebrionidae; ... **3.0211**

SUSCEPTIBILITY OF VARIETIES OF MAIZE AND COWPEAS TO PRIMARY STORAGE INSECT ATTACK ... Bruchidae; Cereal Crops; Insect Resistance; Pulse Crops; Stored Grain Insects; ...**3.0215**

PESTS OF KOLA IN NIGERIA ... Beverage Crops; BHC; Cola; Insect Utilization; Phostoxin; ...**9.0143**

SWEET POTATO BREEDING ... Breeding & Genetics; Insect Resistance; Ipomoea; Nursery Observational Plots; Storage Changes; ...**9.0183**

SWEET POTATO ENTOMOLOGY ... Economics of Chemical Control; Ferric Luvisols; Ipomoea; Vectors; ...**9.0188**

PESTS OF SWEET POTATOES ... Ipomoea; Population Dynamics; Surveys; Vegetables; ...**9.0256**

Dermestidae

MARKING INSECT PREDATORS OF FOOD COMMODITIES ... Cereal Crops; Oilseed Crops; Population Dynamics; Pulse Crops; Radioactive Isotopes; Surveys; ...**8.0010**

Scolytidae

STUDIES ON AMBROSIA BEETLE POPULATIONS IN THE FOREST ZONES OF GHANA ... Coleoptera -other; Forestry Insects; Population Dynamics; Surveys; ...**3.0092**

Tenebrionidae

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Barriers & Weirs; Control of Nuisance Species; DDVP; Phosphorothioate Cpds.; Storage; ...**3.0211**

INSECTICIDE TESTING PROGRAM ... Baytex; C 9491; Pesticides -other; Rainfall Surplus; ...**9.0339**

Diptera

STUDIES ON THE BACTERIAL LEAF BLIGHT OF COWPEA (VIGNA UNGUICULATA (L) WALP) ... Blight Diseases; Pulse Crops; Vectors; Xanthomonas; ...**9.0215**

Cecidomyiidae

DEVELOPMENT OF MEDIUM MATURING, SHORT STATURE, HIGH YIELDING SORGHUM VARIETIES OF ACCEPTABLE PALATABILITY AND RESISTANT TO PESTS & DISEASE ... Breeding & Genetics; Disease Resistance; Dry Monsoon 5 Months, Plus; Insect Resistance; Smuts; Sorghum Vulgare (Grain); ...**3.0179**

THE DEVELOPMENT OF LATE MATURING, SHORT VARIETIES OF ACCEPTABLE PALATABILITY & RESISTANT TO PESTS & DISEASE ... Breeding & Genetics; Disease Resistance; Dry Monsoon 5 Months, Plus; Insect Resistance; Smuts; Sorghum Vulgare (Grain); ...**3.0184**

SORGHUM CROP PROTECTION ... Cereal Crops; Rearing of Insects; Scrophulariaceae; Seedling Diseases -nonspecific; Smuts; Tettigonidae; ...**9.0159**

Culicidae -other

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Pathology -mammal; Serology; Veterinary Medicine; ...**11.0099**

Hippoboscidae

TRYPANOSOMIASIS - ENTOMOLOGICAL STUDY OF THE VECTORS ... Muscidae; Tabanidae; Taxonomy, Animal; Trypanosoma; Veterinary Entomology; Veterinary Medicine; ... **11.0094**

Muscidae

OBSERVATIONS ON GROWTH AND PERFORMANCE ON NUBIAN GOATS ... Berenil; Goat Husbandry; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**5.0012**

OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE ... Berenil; Management; Pesticides -other; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**5.0021**

CONTROL CAMPAIGN AGAINST TSETSE FLIES AND ANIMAL TRYPANOSOMIASES ... Barriers & Weirs; DDT; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**8.0021**

BOVINE OCULAR THELAZIOSIS - TREATMENTS ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Cyanides; Tetramisole; Veterinary Medicine; ...**11.0087**

BOVINE OCULAR THELAZIOSIS - AETIOLOGY ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Epidemiology of Disease; Veterinary Medicine; ...**11.0088**

TRYPANOSOMIASES - CONTROL CAMPAIGN AGAINST THE VECTORS ... Dieldrin; Surveys; Trypanosoma; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ... **11.0092**

TRYPANOSOMIASIS - ENTOMOLOGICAL STUDY OF THE VECTORS ... Hippoboscidae; Tabanidae; Taxonomy, Animal; Trypanosoma; Veterinary Entomology; Veterinary Medicine; ... **11.0094**

BIOLOGICAL CONTROL OF GLOSSINA SPECIES ... Cesium; Sterile Release; Veterinary Entomology; ...**14.0043**

Tabanidae

TRYPANOSOMIASIS - ENTOMOLOGICAL STUDY OF THE VECTORS ... Hippoboscidae; Muscidae; Taxonomy, Animal; Trypanosoma; Veterinary Entomology; Veterinary Medicine; ... **11.0094**

Tachinidae

BATHYCOELIA THALASSINA (HETEROPTERA) ON CACAO ... Beverage Crops; Hemiptera -other; Maturity & Growth Stages; Parasites -biocontrol; Population Dynamics; ... **9.0132**

Hemiptera

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Chrysomelideae; Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

THE INSECT PESTS OF THE OIL PALM IN NIGERIA ... Coleoptera; Lepidoptera; Oilseed Crops; Pests; Population Dynamics; Surveys; ...**9.0286**

THE INSECT PESTS OF THE COCONUT PALM IN NIGERIA ... Cocos; Coleoptera; Lepidoptera; Oilseed Crops; Pests; Surveys; ...**9.0309**

THE INSECT PESTS OF THE RAPHIA PALM IN NIGERIA ... Lepidoptera; Oilseed Crops; Pests; Surveys; ...**9.0310**

Hemiptera -other

INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON ... Economics of Chemical Control; Gelechiidae; Noctuidae; Surveys; Trap Crops; ...**3.0132**

BIOGENETIC STUDY OF INSECT MARAUDERS OF COTTON IN THE IVORY COAST ... Habitat Studies; Homoptera -other; Migration; ...**4.0062**

BATHYCOELIA THALASSINA (HETEROPTERA) ON CACAO ... Beverage Crops; Maturity & Growth Stages; Parasites -biocontrol; Population Dynamics; Tachinidae; ...**9.0132**

Miridae

BIOLOGICAL RESEARCH STUDIES ON MIRID OF COCOA - DISTANTIELLA THEOBROMAE ... Bacteria; Disease -biocontrol; Entomology, Physiology; Host Preference, Host-insect; Rearing of Insects; ...**4.0063**

FIELD TRIALS ON PESTICIDES AGAINST COCOA MIRIDS ... Beverage Crops; Ferralic Arenosols; Foliar Application; Management; Thiodan; Two Humid Seasons; ...**4.0144**

BIO-ECOLOGY OF THE COCOA MIRID ... Beverage Crops; Entomology, Physiology; Factors Affecting Insect Pop.; Moisture Deficiency; Population Dynamics; Sex Ratio; ...**9.0130**

CONTROL OF MIRIDS ON COCOA ... Beverage Crops; BHC; Insecticides -nonspecific; Selectivity of Pesticides; ...**9.0131**

Pentatomidae

BIOLOGICAL AND ECOLOGICAL RESEARCH WORK ON THE ENTOMOLOGICAL FAUNA OF THE HERBACEOUS SWARD OF A PRE-FOREST SAVANNAH ... Energy Budgets; Forests; Mantidae; Population Dynamics; Surveys; ...**4.0061**

Homoptera

Aleyrodidae

IDENTIFICATION OF DISEASES OF FOOD CROPS - MANIOC (CASSAVA) AND YAMS ... Electron Microscopy; Manihot; Phytopathology; Vectors; Viral Transmission; ... **4.0076**

Aphididae

NATURAL CROSSING IN KENAF IN GHANA ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Halictidae; ... **3.0140**

Lepidoptera

BIOLOGICAL CONTROL OF INSECT PARASITES OF THE COTTON PLANT ... Fiber Crops; Predators -biocontrol; Rearing of Insects; Trichogrammatidae; ...**6.0082**

THE INSECT PESTS OF THE OIL PALM IN NIGERIA ... Coleoptera; Hemiptera; Oilseed Crops; Pests; Population Dynamics; Surveys; ...**9.0286**

THE INSECT PESTS OF THE COCONUT PALM IN NIGERIA ... Cocos; Coleoptera; Hemiptera; Oilseed Crops; Pests; Surveys; ...**9.0309**

THE INSECT PESTS OF THE RAPHIA PALM IN NIGERIA ... Hemiptera; Oilseed Crops; Pests; Surveys; ...**9.0310**

Arctiidae

PESTS OF EUPATORIUM ODORATUM ... Eupatorium; Ornamentals; Parasites -biocontrol; Rearing of Insects; ...**9.0258**

Crambidae

INVESTIGATIONS INTO THE BIONOMICS AND CONTROL OF INSECT PESTS ON SUGAR CANE ... Dip Application; Isoptera; Saccharum; Toxaphene; ...**3.0135**

BIOLOGY AND CONTROL OF CEREAL STEM BORERS (LEPIDOPTERA) ... Continuous Humid 7 Months,Plus; Economics of Chemical Control; Multiple Cropping; Parasites -biocontrol; Sevin; ...**3.0136**

COLLECTION OF VARIETIES FOR THE PLUVIAL RICE-FIELDS ... Breeder Stock; Cereal Crops; Insect Resistance; Piricularia; Seed Bank; ...**4.0160**

INVENTORY OF THE INSECTS HARMFUL TO RICE IN MALI AND EVALUATION OF THE LOSSES ... Cereal Crops; Insecticides -nonspecific; Pests; Rearing of Insects; ...**6.0058**

TO SURVEY FIELD PESTS OF RICE IN NIGERIA ... Cereal Crops; Coleoptera -other; Surveys; ...**9.0013**

TO STUDY THE BIOLOGY AND ECOLOGY OF DIFFERENT SPECIES OF RICE STEM BORERS ... Cereal Crops; Habitat Studies; ...**9.0014**

TO CONTROL FIELD PESTS OF RICE - (I) EVALUATION OF DIFFERENT INSECTICIDES ... Biological Control; Cereal Crops; Insecticides -nonspecific; Integrated Control; Surveys; ...**9.0015**

SCREENING OF MAIZE GERMPLASM FOR RESISTANCE TO INSECT PESTS ... Breeding & Genetics; Cereal Crops; Insect Resistance; ...**9.0257**

PESTS OF SUGARCANE ... Outbreaks of Insects; Saccharum; Sugar Crops; Surveys; ...**9.0263**

BIOLOGY, ECOLOGY AND CONTROL OF RICE INSECT PESTS ... Behavioral Ecology; Habitat Studies; Insect Resistance; Predators -biocontrol; Surveys; ...**10.0003**

Gelechiidae

INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON ... Economics of Chemical Control; Noctuidae; Surveys; Trap Crops; ...**3.0132**

CHEMICAL CONTROL OF THE LEPIDOPTERA PARASITIC ON THE COTTON POD IN THE IVORY COAST ... Bioassay; Lepidoptera -other; Olethreutidae; ...**4.0281**

Lepidoptera -other

STUDIES ON THE BIONOMICS OF POTENTIALLY DANGEROUS INSECTS ATTACKING INDIGENOUS PLANTATIONS OF ACCEPTED EXPORT TIMBER SPECIES ... Chlorophora; Forests; Population Dynamics; Pyralidae; Terminalia; ...**3.0093**

CHEMICAL CONTROL OF THE LEPIDOPTERA PARASITIC ON THE COTTON POD IN THE IVORY COAST ... Bioassay; Gelechiidae; Olethreutidae; ...**4.0281**

STUDY OF BIOLOGY AND CONTROL OF BORERS ... Forestry Insects; Nauclea; Population Dynamics; Surveys; Terminalia; Triplochiton; ...**9.0093**

STUDY OF THE BORERS OF MILLET - ACIGONA IGNEFUSALIS ... Cereal Crops; Ichneumonidae; Parasites -biocontrol; ...**11.0069**

Noctuidae

RESEARCH INTO METHODS FOR THE INTEGRATED CONTROL OF COTTON PESTS IN DAHOMEY ... Behavioral Ecology; Dystric Nitosols; Fiber Crops; Insect Viruses -other; Integrated Control; Olethreutidae; ...**1.0048**

INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON ... Economics of Chemical Control; Gelechiidae; Surveys; Trap Crops; ...**3.0132**

BIOLOGY AND CONTROL OF CEREAL STEM BORERS (LEPIDOPTERA) ... Continuous Humid 7 Months,Plus; Economics of Chemical Control; Multiple Cropping; Parasites -biocontrol; Sevin; ...**3.0136**

STUDY THE ATTRACTIVITY OF PLANT MATERIAL TO THE NOCTURNAL MOTH OF THE CACAO-TREE - EARIAS BIPLAGA ... Beverage Crops; Host Preference, Host-insect; Insect Resistance; Klendusity; ...**4.0134**

BIOLOGICAL CONTROL OF HELIOTHIS ARMIGERA ... Disease -biocontrol; Fiber Crops; Isolation of Viruses; Multiplication & Replication; Polyhedrosis Viruses; Rearing of Insects; ...**4.0278**

CHEMICAL CONTROL OF THE LEPIDOPTERA PARASITIC ON THE COTTON POD IN THE IVORY COAST ... Bioassay; Gelechiidae; Lepidoptera -other; Olethreutidae; ...**4.0281**

PESTS OF CITRUS ... Citrus; Coccidae; Ecology, Animal; Fruits and Berries; ...**9.0259**

Olethreutidae

RESEARCH INTO METHODS FOR THE INTEGRATED CONTROL OF COTTON PESTS IN DAHOMEY ... Behavioral Ecology; Dystric Nitosols; Fiber Crops; Insect Viruses -other; Integrated Control; ...**1.0048**

INTEGRATED CONTROL OF CRYPTOPHLEBIA, BY ADDITION OF VIRUSES TO THE CHEMICAL INSECTICIDES ... Disease -biocontrol; Fiber Crops; Humid 6 M.or Less; Mode of Action; Peprothion; ...**1.0051**

BIOLOGICAL CONTROL OF CRYPTOPHLEBIA LEUCOTRETA ... Disease -biocontrol; Fiber Crops; Granulosis Viruses; Multiplication & Replication; Polyhedrosis Viruses; Rearing of Insects; ...**4.0277**

SEXUAL ATTRACTION IN CRYPTOPHLEBIA LEUCOTRETA ... Bait Traps; Entomology, Applied; Insect Pheromones; ...**4.0280**

CHEMICAL CONTROL OF THE LEPIDOPTERA PARASITIC ON THE COTTON POD IN THE IVORY COAST ... Bioassay; Gelechiidae; Lepidoptera -other; ...**4.0281**

SCREENING OF GERMPLASM FOR INSECT RESISTANCE ... Breeding & Genetics; Insect Resistance; Phycitidae; Pulse Crops; ...**9.0266**

SURVEY OF PARASITES AND PREDATORS OF MARUCA TESTULALIS AND LASPEYRESIA PTYCHORA ... Formicidae; Parasites -biocontrol; Predators -biocontrol; Pulse Crops; ...**9.0269**

INSECTICIDAL CONTROL OF COWPEA PESTS ... Lindane; Maturity or Growth Stage; Pulse Crops; Sequential, Daily, Weekly, Etc; ...**9.0270**

Phycitidae

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Chrysomelideae; Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

SCREENING OF GERMPLASM FOR INSECT RESISTANCE ... Breeding & Genetics; Insect Resistance; Olethreutidae; Pulse Crops; ...**9.0266**

Pyralidae

STUDIES ON THE BIONOMICS OF POTENTIALLY DANGEROUS INSECTS ATTACKING INDIGENOUS PLANTATIONS OF ACCEPTED EXPORT TIMBER SPECIES ... Chlorophora; Forests; Population Dynamics; Terminalia; ...**3.0093**

Pyraustidae

DEVELOPMENT OF IMPROVED CROPPING PATTERNS FOR SMALL ASIAN RICE FARMS ... Cereal Crops; Intercropping; Management; Phaseolus; Rain; ...**10.0011**

Saturniidae

PRODUCTION OF SILK IN NIGERIA ... Industrial Use of Invertebrate; Insect Utilization; Rearing of Insects; ...**9.0260**

Orthoptera

Acrididae

BIOLOGICAL AND ECOLOGICAL RESEARCH WORK ON THE ENTOMOLOGICAL FAUNA OF THE HERBACEOUS SWARD OF A PRE-FOREST SAVANNAH ... Energy Budgets; Forests; Mantidae; Population Dynamics; Surveys; ...**4.0061**

CASSAVA ENTOMOLOGY ... Continuous Humid 7 Months,-Plus; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Pseudococcidae; Vectors; ...**9.0187**

Mist Irrigation

Sprinkler Irrigation

Surface Irrigation -general

Isolation of Viruses

See Viral and Rickettsial Studies

Isoptera

See Insecta

Isotopes

Radioactive Isotopes

Carbon

Cesium

Cobalt

Nitrogen

Phosphorus

Rubidium

Sulfur

Stable Isotopes

Nitrogen

Luvisols
See Soil Unit Classification

Lycopersicum
See Plants - Dicots
Solanaceae

Lysimeters
BALANCE OF MINERAL ELEMENTS UNDER CULTIVATION - MAINTENANCE FERTILIZATION ... Continuous Humid; Fertilizer Losses; Organic Fertility; Removal of Nutrients from Soil; Soil Analysis; ...**4.0158**

BALANCE OF MINERAL ELEMENTS UNDER CULTIVATION - MAINTENANCE FERTILIZATION ... Ferralic Cambisols; Fertilizer Losses; Organic Fertility; Removal of Nutrients from Soil; Soil Analysis; Two Humid Seasons-7 Month,Plus; ... **4.0213**

WATER REQUIREMENTS OF IRRIGATED CROPS ... Humid 1 Month; Irrigation -general; Management; Soil Moisture; ... **7.0002**

IRRIGATION SYSTEMS INVESTIGATION - HYDROLOGIC CHARACTERIZATION OF SMALL WATERSHEDS IN THE HUMID TROPICS ... Fertilizer Losses; Irrigation -general; Subsurface Runoff; Water Cycle; Watersheds; ...**9.0160**

WATER REQUIREMENTS OF IRRIGATED CROPS ... Irrigation; Irrigation -general; Management; Nuclear Moisture Meters; Soil Moisture; Sorghum Vulgare (Grain); ...**11.0010**

IMPROVEMENT OF THE NITROGENOUS FERTILITY OF THE SOIL BY APPLICATION OF ORGANIC NITROGEN ... C/N Ratio; Manure; Plant Residues -other; Soil pH; ... **11.0057**

Lysine
See Amino Acids

Machining
See Materials

Magnesium
See Also Soil Nutrients/Fertilizers

GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; Sulfates; ...**3.0061**

STUDY THE MINERAL NUTRITION OF OIL PALM ACCORDING TO THE PLANT MATERIAL ... Calcium; Deficiencies; Management; Phosphorus; Sulfur; ...**4.0299**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON GROWTH ... Calcium; Growth Stage of Plant; Management; Nitrogen; Phosphorus; Potassium; ...**5.0004**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON YIELD ... Calcium; Management; Nitrogen; Phosphorus; Potassium; ...**5.0005**

MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM) ... Calcium; Nitrogen; Potassium; Sorghum Vulgare (Grain); ...**11.0059**

Malathion
See Pesticides
Insecticides

Male Sterility
See Genetics
Genetic & Breeding Methods

Maleic Hydrazide
See Pesticides
Plant Growth Regulators

Mallard
See Birds

Malnutrition
See Nutrition, Medical
See Vertebrate Nutrition

Malting Food
See Food Science and Technology
Processing of Food

Maltose
See Carbohydrates

Malvaceae
See Plants - Dicots

Mammals
ADAPTATION OF MATERIAL FOR A POLYCULTIVATOR FOR ANIMAL TRACTION ... Design,Modify,Develop.of Equip; Soil Preparation & Renovation; ...**11.0039**

Bovidae
STUDIES WITH THE SMALL RUMINANTS ... Dry Monsoon 4 to 5 Months; Sheep Husbandry; Veterinary Medicine; ... **3.0019**

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Etiology; Pleuropneumonia Group; Pulmonary Syndrome; Rinderpest; ...**11.0097**

Carnivora

Canidae

ECOLOGICAL PARASITOLOGY ... Fish; Marine Animals; Population Dynamics; Taxonomy, Animal; ...**12.0002**

Equidae

Equus

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Pathology -mammal; Serology; Veterinary Medicine; ...**11.0099**

EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY ... Equine Encephalomyelitis; Etiology; Horses; Picornaviruses; Veterinary Entomology; ...**11.0100**

LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Histology and Cytology; Leptospiroses; Pathology -mammal; Veterinary Medicine; ...**11.0104**

Rodentia
SALMONELLOSIS - EPIDEMIOLOGICAL SURVEY ON HEALTHY CARRIERS ... Birds; Feces; Salmonelloses; ... **11.0105**

Muridae

IMMUNOLOGICAL STUDIES INTO ANIMAL TRYPANOSOMIASIS ... Trypanosomiases; Veterinary Medicine; ...**3.0056**

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Barriers & Weirs; Control of Nuisance Species; DDVP; Phosphorothioate Cpds.; Storage; Tenebrionidae; ... **3.0211**

NUTRITIVE VALUE OF OPAQUE-2 MAIZE FOR THE CHICK AND RAT IN THE TROPICS ... Chicken, Domestic; In Vitro Feed Studies; Poultry Rations; Supplements, Feed Additives; ... **9.0023**

COMMERCIAL PRODUCTION OF SOY-OGI AND GARI ... Child Developmental Stages; Food Proteins; Nutritive Value of Food; ...**9.0060**

EVALUATION OF THE NUTRITIVE QUALITY OF BEANS ... Feed Proteins & Amino Acids; Management; Nutritive Value of Food; Phaseolus; Vegetable & Vegetable Products; ...**9.0207**

LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Histology and Cytology; Leptospiroses; Pathology -mammal; Veterinary Medicine; ...**11.0104**

Rodentia -other

ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Habitat Studies; Population Dynamics; Rodenticides; ...**4.0059**

BIOLOGY AND PHYSIOLOGY OF A SAVANNAH RODENT ... Breeding & Genetics; Hormones; Pregnancy; Sexual Cycle; Vagina; ...**4.0060**

STUDY OF RICE PESTS ... Barriers & Weirs; Cereal Crops; Insecta; Management; ...**5.0014**

Mammals - Wildlife Studies
See Fish & Wildlife Biology

Management
See Agronomy
- **Beverage Crops**
- **Cereal Crops**
- **Fiber Crops**
- **Forage Grasses**
- **Forage Legumes**
- **Industrial & New Crops**
- **Oilseed Crops**
- **Pulse Crops**
- **Range Management**
- **Seed Production**
- **Sugar Crops**
- **Tobacco Crops**

See Animal Husbandry
- **Beef Husbandry**
- **Dairy Husbandry**
- **Goat Husbandry**
- **Poultry Husbandry**
- **Sheep Husbandry**
- **Swine Husbandry**

See Economics
- **Production and Processing**

See Fish & Wildlife Biology
- **Mammals - Wildlife Studies**

See Horticulture
- **Condiment, Spice & Herb Crops**
- **Fruits and Berries**
- **Leafy & Fruit-type Vegetables**
- **Nut Crops**
- **Root Crops**
- **Vine,Shrub, Bramble Fruit Crop**

See Social Sciences

Management Effects on Soils
See Soil Physical Properties
- **Soil Structure**

Manganese
See Soil Nutrients/Fertilizers

Mangifera
See Plants - Dicots
- **Anacardiaceae**

Manihot
See Plants - Dicots
- **Euphorbiaceae**

Mantidae
See Insecta
- **Orthoptera**

Manure
See Organic Fertility

Mapping
See Ecology, Plant

Marine Animals
SCREENING TEST OF SPECIES AND TWO PRESERVATIVES AGAINST MARINE BORERS ... Crustacea; Factors Affecting Insect Pop.; Insect Resistance; Lamellibranchiata; Maturity & Growth Stages; Wood Preservatives; ...**3.0095**

ECOLOGICAL PARASITOLOGY ... Fish; Population Dynamics; Taxonomy, Animal; ...**12.0002**

Market Structure
See Economics

Marketing
See Economics

Marketing Organizations
See Ag Industries & Agribusiness

Marsh
See Environments, Plant

Mass Communication
See Communication

Mastitis
See Veterinary Medicine

Materials

Cellulosic Fiber
STUDY THE DIFFERENT FACTORS WHICH INFLUENCE THE INDUSTRIAL PICKING YIELD OF COTTON IN THE IVORY COAST ... Crop Production, Harvesting; Fiber Cleaning; Humidity; ...**4.0283**

Chemical Materials
EFFICACY OF PRESERVATIVES UNDER GHANAIAN CONDITIONS ... Wood; Wood Preservation & Seasoning; Wood Preservatives; ...**3.0097**

TANNIN EXTRACTION ... Extract Composition; Finishes of Textiles; Forest Product Development; Leather; Tannin; ...**3.0102**

PROTECTION OF WOOD AGAINST FIRE ... Borax; Finishes of Textiles; Meliaceae -other; Sapotaceae; ...**3.0110**

TECHNOLOGY OF NATURAL RUBBER - RUBBER FROM CUMULATIVE TAPPING ... Intraspec. Genetic Relations; Mechanical Properties; Processing -general; Two Humid Seasons; ...**4.0254**

THE SUITABILITY OF NIGERIAN TIMBERS FOR RAILWAY SLEEPERS ... Corrosion, Deterioration; Mechanical Properties; Railroads; Wood; Wood Preservatives; ...**9.0104**

Composition
EVALUATION OF THE PROPERTIES OF THE RUBBERS OF THE IVORY COAST - SPECIFICATION OF RUBBER ...

Physical Properties

PROPERTIES OF GHANAIAN TIMBERS ... Mechanical Properties; Wood; Wood Structure & Properties; ...**3.0104**

TECHNOLOGY OF NATURAL RUBBER - RUBBER FROM CUMULATIVE TAPPING ... Chemical Materials; Intraspec. Genetic Relations; Mechanical Properties; Processing -general; Two Humid Seasons; ...**4.0254**

TECHNOLOGY OF NATURAL RUBBER - RUBBERS STRETCHED BY OIL ... Costs; Latex; Rubber -natural; ... **4.0255**

STUDY OF PROPERTIES AND CHARACTERISTICS OF NIGERIAN FOREST TIMBER SPECIES ... Drying; Fungal Resistance; Machining; Pathology, Forest; Plant Morphology; Wood Preservation & Seasoning; Wood Structure & Properties; ...**9.0095**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Terminalia; Wood Preservation & Seasoning; Xylem; ...**9.0096**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Khaya; Nauclea; Triplochiton; Wood Preservation & Seasoning; ...**9.0106**

TYPE AND SIZE OF CONTAINERS FOR RAISING NURSERY STOCK ... Eucalyptus; Nursery Observational Plots; Packaging Materials; Radiation Effects; Silviculture; ...**9.0346**

Processing -general

TECHNOLOGY OF NATURAL RUBBER - RUBBER FROM CUMULATIVE TAPPING ... Chemical Materials; Intraspec. Genetic Relations; Mechanical Properties; Two Humid Seasons; ...**4.0254**

Radiation Effects

TYPE AND SIZE OF CONTAINERS FOR RAISING NURSERY STOCK ... Eucalyptus; Nursery Observational Plots; Packaging Materials; Physical Properties; Silviculture; ...**9.0346**

Recycled and Secondary Mtls.

TECHNOLOGY OF NATURAL RUBBER - MASTER-MIXTURES BASED ON LOCAL PRODUCTS ... Casein; Fillers, Extenders; Latex; Quality and Utilization; Rubber -natural; ... **4.0256**

Residential

WOOD WOOL LOW COST HOUSES ... Buildings, Farm; Construction, Farm; Low Cost Housing; Sheet; ...**3.0106**

Rubber -natural

EVALUATION OF THE PROPERTIES OF THE RUBBERS OF THE IVORY COAST - SPECIFICATION OF RUBBER ... Composition; Latex; Mechanical Properties; Two Humid Seasons; ...**4.0253**

TECHNOLOGY OF NATURAL RUBBER - RUBBER FROM CUMULATIVE TAPPING ... Chemical Materials; Intraspec. Genetic Relations; Mechanical Properties; Processing -general; Two Humid Seasons; ...**4.0254**

TECHNOLOGY OF NATURAL RUBBER - RUBBERS STRETCHED BY OIL ... Costs; Latex; Physical Properties; ... **4.0255**

TECHNOLOGY OF NATURAL RUBBER - MASTER-MIXTURES BASED ON LOCAL PRODUCTS ... Casein; Fillers, Extenders; Latex; Quality and Utilization; ...**4.0256**

TECHNOLOGY OF NATURAL RUBBER - PROCESSING OF THE RUBBER IN A GRANULAR FORM ... Drying; Forms -other; Harvest and Storage; Instrumentation, Equipment; Latex; Two Humid Seasons; ...**4.0257**

Sheet

WOOD WOOL LOW COST HOUSES ... Buildings, Farm; Construction, Farm; Low Cost Housing; ...**3.0106**

Solar Processes

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Ulmaceae -other; Wood Preservation & Seasoning; ...**9.0105**

Wood

DIFFUSION-IMPREGNATION OF BUILDING TIMBER IN BORON-BASED PRESERVATIVE FORMULATIONS ... Boron; Wood Preservation & Seasoning; Wood Preservatives; ... **3.0096**

EFFICACY OF PRESERVATIVES UNDER GHANAIAN CONDITIONS ... Chemical Materials; Wood Preservation & Seasoning; Wood Preservatives; ...**3.0097**

TESTING NEW SPECIES FOR USE AS RAIL SLEEPERS ... Railroads; Wood Preservatives; ...**3.0098**

FIELD TEST OF TREATED ROUND POSTS FOR FENCING ... Eucalyptus; Fencing; Tectona; Wood Preservation & Seasoning; ...**3.0099**

TIMBER SPECIES FOR WOOD WOOL CEMENT SLABS ... Construction Materials; Forest Product Development; Forms -other; Setting, Curing; ...**3.0103**

PROPERTIES OF GHANAIAN TIMBERS ... Mechanical Properties; Physical Properties; Wood Structure & Properties; ... **3.0104**

WOOD WOOL LOW COST HOUSES ... Buildings, Farm; Construction, Farm; Low Cost Housing; Sheet; ...**3.0106**

PROTECTION OF WOOD AGAINST FIRE ... Borax; Chemical Materials; Finishes of Textiles; Meliaceae -other; Sapotaceae; ... **3.0110**

STUDY OF PROPERTIES AND CHARACTERISTICS OF NIGERIAN FOREST TIMBER SPECIES ... Drying; Fungal Resistance; Machining; Pathology, Forest; Plant Morphology; Wood Preservation & Seasoning; Wood Structure & Properties; ...**9.0095**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Physical Properties; Terminalia; Wood Preservation & Seasoning; Xylem; ...**9.0096**

THE PERFORMANCE OF TIMBER JOINTS AND FASTENINGS FOR INDUSTRIAL APPLICATION ... Construction, Farm; Joining & Bolting; ...**9.0097**

FABRICATION AND TESTING OF TIMBER STRUCTURES AND COMPONENTS ... Codes and Standards; Construction Materials; Construction, Farm; Laminates; Mechanical Properties; Processing Forest Products; ...**9.0098**

NIGERIAN GROWN SPECIES FOR TRANSMISSION POLES ... Construction Materials; Electric Power Transmission; Nauclea; Wood Structure & Properties; ...**9.0099**

CONVERSION STUDIES ON A HORIZONTAL BANDSAW ... Forest Industry; Instrumentation, Equipment; Lumbering; Machining; Xylem; ...**9.0100**

NIGERIAN TIMBERS FOR SPORTS GOODS ... Forest Product Development; Holoptelea; Outdoor Recreation; Ulmaceae -other; Wood Structure & Properties; ...**9.0101**

THE SUITABILITY OF NIGERIAN TIMBERS FOR RAILWAY SLEEPERS ... Chemical Materials; Corrosion, Deterioration; Mechanical Properties; Railroads; Wood Preservatives; ... **9.0104**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ... **9,0105**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Khaya; Nauclea; Triplochiton; Wood Preservation & Seasoning; ...**9.0106**

Mathematical Models

MECHANIZATION OF TROPICAL AGRICULTURE ... Continuous Humid 7 Months,Plus; Design,Modify,Develop.of Equip; Ferralic Cambisols; Ferric Luvisols; Soil Tillage Methods -other; Tractors and Accessories; ...**9.0184**

ANALYSIS OF FACTORS OF CROP YIELD IN A PEASANT ENVIRONMENT ... Supply; ...**11.0011**

ECONOMIC ANALYSIS OF PEASANT FARMERS' HOLDINGS ... Capital & Financial Management; Management; ... **11.0012**

Maturity & Growth Stages

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Maturity or Growth Stage

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Timing of Application

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Herbicides

Measurement of Trees & Stands
See Forestry

Meats and Meat Products
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Mechanical Cleaning -other
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Mechanical Control
See Pest Control Measures
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Mechanical Power

Engines
DESIGN AND DEVELOPMENT OF A TRACTOR AND RELATED IMPLEMENTS FOR LOCAL MANUFACTURE ... Design,Modify,Develop.of Equip; Gearing and Power; Soil Preparation & Renovation; Tractors and Accessories; ...**9.0052**

Gearing and Power
DESIGN AND DEVELOPMENT OF A TRACTOR AND RELATED IMPLEMENTS FOR LOCAL MANUFACTURE ... Design,Modify,Develop.of Equip; Engines; Soil Preparation & Renovation; Tractors and Accessories; ...**9.0052**

Heat and Cooling Devices
DEVELOPMENT OF A LOW COST INCUBATOR FOR LOCAL USE ... Buildings & Land Development; Construction, Farm; Costs; Poultry Equipment; ...**9.0047**

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Medicago
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Leguminosae

Medicine/Psyc.- General Topics

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TRYPANOSOMIASES - IMMUNOLOGY ... Epidemiology of Disease; Immunology; Trypanosoma; Trypanosomiases; Veterinary Medicine; ...**11.0091**

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Fetus; Urogenital System; Viral Vaccines; ...**11.0102**

INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM ... Bacterial Toxins; Clostridia; Etiology; Pathology -mammal; Toxoid Vaccine; Water Environment; ...**11.0109**

AVIAN DISEASES - EPIDEMIOLOGY - PROPHYLAXIS AND TREATMENT ... Birds; Epidemiology of Disease; Treatment; Veterinary Medicine; ...**11.0114**

Etiology
BOVINE OCULAR THELAZIOSIS - AETIOLOGY ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Epidemiology of Disease; Muscidae; Veterinary Medicine; ...**11.0088**

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Bovidae; Pleuropneumonia Group; Pulmonary Syndrome; Rinderpest; ...**11.0097**

EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY ... Equine Encephalomyelitis; Horses; Picornaviruses; Veterinary Entomology; ...**11.0100**

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Pasteurella; Pneumonia; Respiratory System; ...**11.0107**

INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM ... Bacterial Toxins; Clostridia; Pathology -mammal; Toxoid Vaccine; Water Environment; ...**11.0109**

Evaluation, Efficacy
IMMUNE RESPONSE TO NEWCASTLE DISEASE VACCINES ... Chicken, Domestic; Globulins; Hemagglutination Inhibition; Immunity; Newcastle Disease; Viral Vaccines; ...**3.0024**

DISEASES OF THE RED GOAT ... Immunity; Rinderpest; Veterinary Medicine; ...**8.0004**

Prophylaxis
RINDERPEST PROPHYLAXIS - ESTABLISHMENT OF A THERMO-RESISTANT VACCINE ... Immunity; Pseudomyxoviruses; Rinderpest; Veterinary Medicine; Viral Vaccines; ...**11.0096**

POX OF SMALL RUMINANTS - EPIDEMIOLOGICAL AND PROPHYLACTIC RESEARCH ... Epidemiology of Disease; Poxviruses; Sheep Scab or Sheep Pox; Viral Vaccines; ...**11.0098**

HEARTWATER PROPHYLAXIS - ESTABLISHMENT OF A METHOD FOR PREMUNITION OF CATTLE ... Dairy Husbandry; Myocardial Edema; Veterinary Medicine; ...**11.0101**

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Diagnosis; Fetus; Urogenital System; Viral Vaccines; ...**11.0102**

Treatment
DEVELOPMENT OF WEANING FOODS FROM VEGETABLE PROTEIN SOURCES ... Baby Foods; Food Proteins; Malnutrition; Nuts & Nutmeats; Therapeutic Nutrition; ...**3.0075**

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Immunity; Rinderpest; Veterinary Medicine; ...**8.0004**

GASTRO-INTESTINAL PARASITISM IN THE RED GOAT ... Coccidia; Digestive Diseases -animal; Feces; Malnutrition; Strongyloidea; ...**8.0006**

BOVINE OCULAR THELAZIOSIS - TREATMENTS ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Cyanides; Muscidae; Tetramisole; Veterinary Medicine; ...**11.0087**

HELMINTHOSES OF FARM ANIMALS - TREATMENTS ... Bovine Ocular Thelaziosis; Trematoda; Veterinary Medicine; Visual Organs; ...**11.0089**

TRYPANOSOMIASES - TREATMENT ... Pesticides -other; Trypanosoma; Trypanosomiases; Veterinary Medicine; ...**11.0093**

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Immunity; Skin or Special Derivatives; Streptothricosis; Veterinary Medicine; ...**11.0113**

AVIAN DISEASES - EPIDEMIOLOGY - PROPHYLAXIS AND TREATMENT ... Birds; Diagnosis; Epidemiology of Disease; Veterinary Medicine; ...**11.0114**

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Melinideae
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Melioidosis
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Molasses
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By-products- Plant(Vegetative)
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Attractants

Molds
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Molinate
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Herbicides

Mollusca

Lamellibranchiata
SCREENING TEST OF SPECIES AND TWO PRESERVATIVES AGAINST MARINE BORERS ... Crustacea; Factors Affecting Insect Pop.; Insect Resistance; Marine Animals; Maturity & Growth Stages; Wood Preservatives; ...**3.0095**

Molybdenum
See Soil Nutrients/Fertilizers

Monolinuron
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Monosaccharides -nonspecific
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Moraceae
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Movement, Availability
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MSMA
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Mucuna
See Plants - Dicots
Leguminosae

Mulches
STUDY OF THE NUTRITION, IN WATER, OF THE OIL PALM ... Cover Crops; Leguminosae; Moisture Deficiency; Paniceae -other; Two Humid Seasons; ...**1.0075**

RESEARCH FOR HYBRID VARIETIES OF CACAO HAVING A GOOD APTITUDE FOR SETTING AND A HIGH DEGREE OF TOLERANCE FOR DROUGHT ... Breeding & Genetics, Spice&Bev; F Generation (F1, F2, F3, Etc); Intraspec. Genetic Relations; Shade; ...**4.0107**

RESEARCH FOR HYBRID VARIETIES OF CACAO HAVING A GOOD APTITUDE FOR SETTLING AND A HIGH DEGREE OF TOLERANCE FOR DROUGHT ... Breeding & Genetics, Spice&Bev; Drought Resistance; F Generation (F1, F2, F3, Etc); Intraspec. Genetic Relations; Moisture Deficiency; Shade; ...**4.0126**

IMPROVEMENT OF THE MASCULINITY OF ELAEIS PISIFERA ... Hormones; Management; Moisture Deficiency; Parthenocarpy; Space Competition; ...**4.0289**

WEED STUDIES IN TREE CROPS ... Cover Crops; Field Crops -nonspecific; Leguminosae; Soil Tillage Sequence / Method; ...**9.0120**

COFFEE AGRONOMY PROJECT ... Beverage Crops; Ethrel; Fruit-set or Fruit-thinning; Management; Shade; Space Competition; ...**9.0145**

EXPERIMENT 17-2. MECHANICAL MAINTENANCE AND MULCHING TREATMENTS OF OIL PALM PLANTATIONS ... Cultcontrol -other; Equipment; Pest, Disease & Weed Control; ...**9.0302**

EXPERIMENT 768-1 - FIELD IRRIGATION OF OIL PALMS ... Irrigation; Irrigation -general; Management; Moisture Levels; ...**9.0308**

CULTIVATION AND WEEDING METHODS IN PLANTATIONS ... Costs; Eucalyptus; Hand Tillage; Mechanical Control; Pinus; ...**9.0356**

Multiple Cropping
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Musaceae

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Diptera

Mutation
See Genetics

Mycobacterium Tuberculosis
See Actinomycetes

Mycorrhiza
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See Fungi

Mycosis
See Animal Pathology

Myocardial Edema
See Animal Pathology

Myristicaceae
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Myxoviruses, True
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Natural Resources Economics
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Nauclea
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Rubiaceae

Nemagon

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Nematocides

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Nematoda

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Nematode Resistance

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Network Project -international

A.I.D.

IMPROVEMENT OF SORGHUM, MILLET AND MAIZE PRODUCTION ... Management; Manure; Sorghum Vulgare (Grain); Space Competition; ...**2.0001**

A.I.E.A.

ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR - BY CEREALS (RICE - MAIZE) ... C/N Ratio; Deficiencies; Irrigation -general; Nitrogen Metabolism; Proteins; ...**4.0196**

EVOLUTION OF NITROGEN IN CULTIVATED SOILS ... Continuous Humid; Nitrogen; Plant Residues -other; ...**4.0197**

C.E.A.

ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR - BY CEREALS (RICE - MAIZE) ... C/N Ratio; Deficiencies; Irrigation -general; Nitrogen Metabolism; Proteins; ...**4.0196**

EVOLUTION OF NITROGEN IN CULTIVATED SOILS ... Continuous Humid; Nitrogen; Plant Residues -other; ...**4.0197**

C.T.F.T.

BIOLOGICAL CONTROL OF DISEASES OF THE ROOTS ... Cover Crops; Fomes; Ganoderma; Phytopathology; Two Humid Seasons; ...**4.0250**

STUDY THE MECHANISM OF THE GENETICS OF HYBRIDATION OF TILAPIA SPECIES ... Breeding & Genetics; Cichlidae; Fish Farming; ...**4.0329**

BREEDING AND SELECTION OF HEVEA BRASILIENSIS FOR HIGH YIELD AND IMPROVED SECONDARY CHARACTERISTICS ... Breeding & Genetics; Disease Resistance; Latex; Open Pollination; Tectona; Wind; Wind or Air Movement; ...**5.0003**

C.Y.M.M.I.T.

MULTILOCAL TRIALS OF MAIZE ... Breeding & Genetics; Continuous Humid; ...**4.0177**

D.G.R.S.T.

ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR - BY CEREALS (RICE - MAIZE) ... C/N Ratio; Deficiencies; Irrigation -general; Nitrogen Metabolism; Proteins; ...**4.0196**

EVOLUTION OF NITROGEN IN CULTIVATED SOILS ... Continuous Humid; Nitrogen; Plant Residues -other; ...**4.0197**

F.A.O.

THE FATE AND POSSIBLE NUTRITIONAL AND TOXICOLOGICAL SIGNIFICANCE OF METHYL BROMIDE RESIDUES IN FUMIGATED COCOA BEANS ... Beverage Crops; Carbon; Industrial, Structural Insects; Methyl Bromide; Persistance of Residues; Storage; ...**3.0216**

STUDIES ON THE NUTRITION OF GROUNDNUTS (ARACHIS HYPOGEA L.) ... Deficiencies; Management; Nitrogen; Placement; ...**3.0225**

RESEARCH ON THE AFRICAN MIGRATORY LOCUST ... Environments, Animal; Factors Affecting Insect Pop.; Migration; Population Dynamics; Surveys; Tettigonidae; ...**6.0005**

IMPROVEMENT OF THE CROPPING TECHNIQUES IN TRADITIONAL AGRICULTURE ... Farm Enterprises -general; Humid 4 Months; Management; Production and Processing; Rain; Vegetables -other; ...**6.0035**

FORAGE CROP EXPERIMENTATION ... Chlorideae -other; Hot Equatorial or Hot Tropical; Management; Mucuna; Panicum; Sorghum Vulgare (Forage); ...**11.0002**

IMPROVEMENT OF IRRIGATED AGRICULTURE IN THE SENEGAL RIVER VALLEY ... Hot Equatorial or Hot Tropical; Irrigation; Irrigation -general; Management; ...**11.0007**

COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH ... Hot Equatorial or Hot Tropical; Low Temp. Above 0 C; Management; ...**11.0008**

AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN ... Climatology; Energy Budgets; Hot Equatorial or Hot Tropical; Rain Patterns; Wind or Air Movement; ...**11.0009**

WATER REQUIREMENTS OF IRRIGATED CROPS ... Irrigation; Irrigation -general; Lysimeters; Management; Nuclear Moisture Meters; Soil Moisture; Sorghum Vulgare (Grain); ...**11.0010**

I.A.E.A.

THE FATE AND POSSIBLE NUTRITIONAL AND TOXICOLOGICAL SIGNIFICANCE OF METHYL BROMIDE RESIDUES IN FUMIGATED COCOA BEANS ... Beverage Crops; Carbon; Industrial, Structural Insects; Methyl Bromide; Persistance of Residues; Storage; ...**3.0216**

THE DISTRIBUTION AND ACTIVITY OF ROOT SYSTEMS OF COCOA ... Management; Phosphorus; Placement; Sand - Loam Soil; Seasonal Application; Soil Depth; ...**3.0217**

FERTILIZER EFFICIENCY STUDIES ON BEANS (PHASEOLUS VULGARIS) AND COWPEA ... Irrigation -general; Management; Nitrogen Fixation; Phosphorus; Soil pH; Timing of Application -other; ...**3.0218**

USE OF ISOTOPES IN STUDIES ON THE NUTRITION OF GROUNDNUTS ... Broadcast Application; Management; Nitrogen Fixation; Sulfur; ...**3.0219**

STUDIES ON THE NUTRITION OF GROUNDNUTS (ARACHIS HYPOGEA L.) ... Deficiencies; Management; Nitrogen; Placement; ...**3.0225**

WATER USE EFFICIENCY OF MAIZE IN SOME NIGERIAN SOILS ... Evapotranspiration; Nuclear Moisture Meters; Radioisotope Tracers; Soil Profile Studies; Soil-water-plant Relationships; ...**9.0193**

FERTILIZER EFFICIENCY STUDIES ON SOYA BEAN AND GROUNDNUTS ... Glycine Max; Irrigation -general; Lime; Management; Nitrogen; Nitrogen Fixation; Phosphorus; ...**11.0074**

I.A.R.

AGRONOMIC FACTORS INFLUENCING SORGHUM PRODUCTION ... Fallowing; Management; Sorghum Vulgare (Grain); Timing of Application -other; Timing of Planting Procedures; ...**9.0157**

SORGHUM CROP PROTECTION ... Cereal Crops; Rearing of Insects; Scrophulariaceae; Seedling Diseases -nonspecific; Smuts; Tettigonidae; ...**9.0159**

I.F.A.C.

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0011**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Management; Passiflora; Plant Virus -general; Sapotaceae; ...**1.0071**

PINEAPPLES - PHYSIOLOGICAL STUDIES ... Bromeliaceae; Fruit-set or Fruit-thinning; Management; Phytopathology; Two Humid Seasons; Xanthix Ferralsols; ...**4.0147**

TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES ... Bromeliaceae; Erosion Control; Management; Removal of Nutrients from Soil; Two Humid Seasons; ...**4.0148**

PINEAPPLES - PHYTOSANITARY PROTECTION ... Bromeliaceae; Fruits and Berries; Horticultural Crops; Phytopathology; Two Humid Seasons; ...**4.0149**

PINEAPPLES. IMPROVEMENT OF THE PLANT - INTERACTION BETWEEN PLANT AND ENVIRONMENT ... Breeding & Genetics; Bromeliaceae; Management; Two Humid Seasons; Xanthix Ferralsols; ...**4.0150**

I.F.C.C.

I.I.T.A.

I.N.R.A.

I.R.A.T.

I.R.C.A.

I.R.C.T.

I.R.H.O.

I.R.R.I.

International Network -general

ENZYMES AND THEIR VARIATION IN INSECT PESTS OF COCOA ... Cholinesterase; Entomology, Physiology; Gel Electrophoresis; Phosphatase -nonspecific; ...**3.0065**

ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR BY CEREALS (RICE-MAIZE) ... C/N Ratio; Ferralic Cambisols; Management; Plant Residues -other; Two Humid Seasons-7 Month,Plus; ...**4.0214**

IMPROVEMENT OF HEVEA - THE OBTAINING OF CROSSINGS STARTING FROM THE NEW ORIGINS ... Breeding & Genetics; Intraspec. Genetic Relations; Pedigree; Two Humid Seasons; ...**4.0233**

MINERAL NUTRITION OF HEVEA - IMPROVEMENT OF THE TECHNIQUES FOR INSPECTION OF MINERAL NUTRITION ... Management; Pueraria; Soil Analysis; Two Humid Seasons; ...**4.0241**

EARLINESS OF TAPPING OF RUBBER TREES ... Harvest and Storage; Two Humid Seasons; ...**4.0242**

STIMULATION OF RUBBER TREES FOR EARLY PRODUCTION ... Growth Retardation of Plants; Harvest and Storage; Management; Plant Growth Regulators; Sequential, Daily, Weekly, Etc; Two Humid Seasons; ...**4.0243**

INFLUENCE OF THE PERIOD OF ARREST OF TAPPING RUBBER TREES UPON GROWTH, PRODUCTION AND TAPPING CUT DISEASES ... Env. Plant Dis. Relation; Harvest and Storage; Management; Phytopathology; Plant Diseases; Two Humid Seasons; ...**4.0246**

TAPPING OF RUBBER TREES - ANTI-RAIN BANDS ... Costs; Harvest and Storage; Management; Rain; Two Humid Seasons; ...**4.0248**

WATER BALANCE OF RAIN-FED CROPS AT KENIEBA (MALI) ... Excessive Moisture; Humid 4 Months; Management; Moisture Deficiency; Rain; Soil-water-plant Relationships; ... **6.0034**

COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH ... Flood Irrigation; Humid 4 Months; Low Temp. Above 0 C; Management; Temperature -air; Temperature or Heat Budgets; ...**6.0036**

AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN ... Climatology; Evapotranspiration; Rain; Solar Light; Wind or Air Movement; ...**6.0037**

WATER REQUIREMENTS OF IRRIGATED CROPS ... Humid 1 Month; Irrigation -general; Management; Soil Moisture; ... **7.0002**

COOLING OF AIR AND WATER IN RICE FIELDS AND RICE GROWTH ... Humid 1 Month; Low Temp. Above 0 C; Management; ...**7.0003**

AGROMETEOROLOGICAL STUDIES IN THE SENEGAL RIVER BASIN ... Climatology; Energy Budgets; Humid 1 Month; Rain Patterns; Wind or Air Movement; ...**7.0004**

ADAPTION TRIAL ON VEGETABLE CROPS ... Brassica Oleracea; Cucurbita; Lactuca; Management; Sprinkler Irrigation; ...**7.0005**

IRRIGATION SYSTEMS INVESTIGATION - HYDROLOGIC CHARACTERIZATION OF SMALL WATERSHEDS IN THE HUMID TROPICS ... Fertilizer Losses; Irrigation -general; Lysimeters; Subsurface Runoff; Water Cycle; Watersheds; ...**9.0160**

PEDOLOGY PROJECT ... Cambisols; Ferric Luvisols; Groundwater; Soil Types; ...**9.0161**

PHYSIOLOGY OF ROOT, TUBER CROPS AND VEGETABLES ... Breeding & Genetics; Ferralic Cambisols; Ipomoea; Plant Morphology; ...**9.0162**

PEPPER IMPROVEMENT ... Breeding & Genetics; Capsicum; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Ferric Luvisols; Synthetic Varieties & Blends; ... **9.0163**

LEAFLY AND FRUIT VEGETABLE IMPROVEMENT ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Ferric Luvisols; Lycopersicum; Synthetic Varieties & Blends; ...**9.0164**

INCORPORATION OF LEAFLY AND FRUIT VEGETABLE AND PEPPER PRODUCTION INTO FARMING SYSTEMS ... Capsicum; Continuous Humid 7 Months,Plus; Ferralic Cambisols; Ferric Luvisols; Lycopersicum; Management; Plant Industries -other; ...**9.0165**

VARIETAL IMPROVEMENT (BREEDING) OF GRAIN LEGUMES ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Leguminosae; Nutritive Values -plant; Seed Bank; ...**9.0166**

GRAIN LEGUME PHYSIOLOGICAL INVESTIGATIONS ... Breeding & Genetics; Glycine Max; Management; Seed Bank; ... **9.0167**

GRAIN LEGUME DISEASE AND NEMATODE INVESTIGATIONS ... Cercospora; Disease Resistance; Diseases; Fungicides -nonspecific; Phytopathology; Plant Nematodes -nonspecific; ... **9.0168**

PEST CONTROL ON COWPEAS - VIGNA UNGUICALATA ... Chrysomelideae; Ferric Luvisols; Insect Resistance; Pests; Seed Bank; Systemic Application; ...**9.0171**

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ... **9.0177**

CASSAVA BREEDING ... Bacterial Wilt; Cercospora; Disease Resistance; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Phytopathology; ...**9.0182**

SWEET POTATO BREEDING ... Breeding & Genetics; Curculionidae; Insect Resistance; Ipomoea; Nursery Observational Plots; Storage Changes; ...**9.0183**

YAM BREEDING ... Breeding & Genetics; Disease Resistance; Ferric Luvisols; Nematode Resistance; Proteins; Starch; ... **9.0186**

CASSAVA ENTOMOLOGY ... Continuous Humid 7 Months,-Plus; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Pseudococcidae; Vectors; ...**9.0187**

SWEET POTATO ENTOMOLOGY ... Curculionidae; Economics of Chemical Control; Ferric Luvisols; Ipomoea; Vectors; ... **9.0188**

YAMS ENTOMOLOGY ... Ferralic Cambisols; Ferric Luvisols; Insecta; Vegetables; ...**9.0189**

CASSAVA PATHOLOGY ... Bacterial Resistance; Breeding & Genetics; Diseases; Environments, Plant; Ferric Luvisols; Mosaic Viruses; Vectors; ...**9.0190**

SWEET POTATO PATHOLOGY ... Breeding & Genetics; Ferric Luvisols; Plant Parts Bank; Root Rot; ...**9.0191**

YAMS PATHOLOGY ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferric Luvisols; Plant Nematodes -nonspecific; Shoe String; Storage Rot; ...**9.0192**

STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA) ... Bacterial Wilt; Insecta; Manihot; Phytopathology; Taxonomy, Plant; Vectors; Xanthomonas; ...**9.0220**

RESEARCH ON VARIETIES OF VIGNA UNGUICULATA WITH GOOD RESPONSE TO INTENSIVE TECHNICS (WATER, FERTILIZERS) ... Hot Equatorial or Hot Tropical; Management; Soil Moisture; ...**11.0003**

STUDY OF WATER REQUIREMENTS OF COTTON UNDER IRRIGATION ... Hot Equatorial or Hot Tropical; Irrigation; Irrigation -general; Management; ...**11.0004**

EXPERIMENTS WITH MAIZE AND SORGHUM ... Hot Equatorial or Hot Tropical; Irrigation; Irrigation -general; Management; Sorghum Vulgare (Grain); ...**11.0005**

RESEARCH ON WHEAT AND BARLEY ... Baking Food; Hordeum Vulgare; Irrigation; Management; Triticum; ...**11.0006**

FOLIAR ANALYSES ON THE COTTON PLANT ... Boron; Management; Sulfur; ...**14.0072**

COMPARATIVE TRIAL OF CHEMICAL WEED-KILLERS IN COTTON PLANTATIONS ... Ferric Luvisols; Hand Tillage; Pesticides -other; Prometryne; ...**14.0086**

Network Project -local

TAPPING SYSTEMS ON HEVEA VARIETIES ... Management; ...**5.0001**

ETHREL STIMULATION OF HEVEA VARIETIES ... D, 2,4-; Ethrel; Management; ...**5.0002**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON GROWTH ... Calcium; Growth Stage of Plant; Magnesium; Management; Nitrogen; Phosphorus; Potassium; ... **5.0004**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON YIELD ... Calcium; Magnesium; Management; Nitrogen; Phosphorus; Potassium; ...**5.0005**

Network Project -national

C.S.I.R.

SELECTION OF PROVISIONAL PLUS TREES ... Cedrela; Seed Production; Terminalia; Tree Breeding; Triplochiton; Variation and Selection; ...**3.0082**

TIMBER SPECIES FOR WOOD WOOL CEMENT SLABS ... Construction Materials; Forest Product Development; Forms -other; Setting, Curing; Wood; ...**3.0103**

PROPERTIES OF GHANAIAN TIMBERS ... Mechanical Properties; Physical Properties; Wood; Wood Structure & Properties; ...**3.0104**

LOG CONVERSION FACTORS ... Measurement of Trees & Stands; ...**3.0105**

WOOD WOOL LOW COST HOUSES ... Buildings, Farm; Construction, Farm; Low Cost Housing; Sheet; ...**3.0106**

DETAILED RECONNAISSANCE SOIL SURVEY OF UPPER AFRAM BASIN ... Geology; Mineralogy; Soil Physical Properties; Soil Survey; ...**3.0220**

EFFECT OF SPACING, VARIETY AND FERTILIZER RATE ON MAIZE YIELD IN GHANA ... Management; Space Competition; ...**3.0224**

EFFECT OF PLOUGHING AND FERTILIZER APPLICATION ON THE YIELD OF CROPS (MAIZE, CASSAVA AND COWPEAS) ... Deep Plowing; Management; Management Effects on Soils; Manihot; Plowing; Soil Depth; ...**3.0226**

THE EFFECTS OF PLANTING DATE ON THE EFFICIENCY OF FERTILIZER NITROGEN AND PHOSPHORUS IN MAIZE PRODUCTION IN SELECTED AREAS IN GHANA ... Management; Timing of Planting Procedures; ...**3.0227**

CORRELATION OF SOIL TEST METHODS WITH CROP YIELDS (MILLET AND GUINEA CORN) ... Extract Composition; Management; Panicum; Soil Analysis; Soil Testing; ... **3.0228**

RESPONSE OF LOWLAND RICE TO NITROGEN, PHOSPHORUS AND POTASSIUM ... Management; ...**3.0229**

RESPONSE OF MAIZE TO NP IN SELECTED MAIZE GROWING AREAS ... Management; ...**3.0231**

C.T.F.T.

PHENOLOGY AND ECOLOGY OF THE SIPO (ENTANDROPHRAGMA UTIL) - RHYTHM OF GROWTH IN NATURAL FOREST ... Climate- Humid Equatorial; Dendrochronology; Meliaceae -other; Phenology, Life Cycle; Plant Morphology; ... **4.0083**

STUDY OF THE BORER OF THE MELIACEAE - HYPSIPYLA ROBUSTA (MOORE) ... Forestry Insects; Insecta -other; Insecticides -nonspecific; Khaya; Parasites -biocontrol; Population Dynamics; ...**4.0085**

PROMOTION OF ABUNDANT COMMERCIAL SPECIES OF WHICH LITTLE USE IS MADE ... Forest Product Development; Lumbering; Policy & Business Methods; Wood Structure & Properties; ...**4.0086**

STUDY THE PISCICULTURAL MANAGEMENT OF ARTIFICIAL WATER RESERVES ... Construction Land Use Effects; Fish & Shellfish Biology; Lakes & Reservoirs; ...**4.0330**

RELATIONS BETWEEN SOIL AND GROWTH FOR PRINCIPAL SPECIES FOR FORESTRY PLANTATIONS ... Ecosystems; Geology; Silviculture; Soil Types; Tectona; ...**4.0344**

STUDY CLEARINGS IN FORESTRY PLANTATIONS OF HIGH PLANTATION DENSITY ... Silviculture; Tectona; ... **4.0345**

SCALE OF PRICES OF CUBAGE WITH DOUBLE ENTRY FOR TEAK - TABLE OF TEAK PRODUCTION IN THE IVORY COAST ... Fiscal Studies; Forest Industry; Policy & Business Methods; Production and Processing; Tectona; ... **4.0346**

F.G.N.

MAIZE HERBICIDE TRIAL ... Bladex; Cereal Crops; Herbicides -nonspecific; Humid 6 Months; Simazine; ...**9.0198**

ECONOMICS OF RICE PRODUCTION IN SELECTED AREAS OF NIGERIA ... Costs; Grain Industries; Management; ...**9.0205**

MEDIUM TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY RESTORATIVE POWERS OF MEDIUM DURATION FALLOWING ... Centrosema; Cynodon; Ferric Acrisols; Legume-grass Mixtures; Organic Fertility; Pueraria; ... **9.0250**

APPLICATION OF RADIOTRACER TECHNIQUE IN THE DETERMINATION OF SOIL AVAILABLE PHOSPHORUS ... Continuous Humid 7 Months,Plus; Ferric Acrisols; Ferric Luvisols; Management; Movement, Availability; Phosphorus; ... **9.0253**

LONG TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY UNDER THREE FUNDAMENTALLY DIFFERENT FARMING SYSTEMS ... Compost; Continuous Humid 7 Months,Plus; Ferric Acrisols; Management; Manure; ...**9.0254**

MAIZE FERTILIZER TRIAL ... Management; Timing of Application -other; ...**9.0275**

MAIZE HERBICIDE TRIAL ... Bladex; Cereal Crops; Economics of Chemical Control; Management; Simazine; ...**9.0276**

LONG TERM SOIL FERTILITY RESTORATIVE PROPERTIES OF NATURAL BUSH, TREE, GRASS AND LEGUME FALLOWS ... Crop Contribution to Soil Fert; Fallowing; Manihot; Orthic Ferralsols; Pueraria; Soil Analysis; ...**9.0366**

MAIZE HERBICIDE TRIAL ... Cereal Crops; Economics of Chemical Control; Management; ...**9.0367**

MAIZE HERBICIDE TRIAL ... Bladex; Cereal Crops; Continuous Humid 7 Months,Plus; Economics of Chemical Control; Management; Simazine; ...**9.0368**

MAIZE FERTILIZER TRIAL ... Management; ...**9.0369**

MAIZE HERBICIDE TRIAL ... Bladex; Cereal Crops; Economics of Chemical Control; Simazine; ...**9.0370**

F.P.R.I.

ACTIVATED CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; Wood Chemistry; ...**3.0107**

THERMAL DECOMPOSITION OF WOOD CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; Thermal Decomposition; Wood Chemistry; ...**3.0108**

PRESERVATION OF SMALL SIZED TIMBER AGAINST FUNGAL AND TERMITE ATTACK ... Fences; Osmosalts; Pesticides -other; Wood Preservation & Seasoning; ...**3.0109**

PROTECTION OF WOOD AGAINST FIRE ... Borax; Chemical Materials; Finishes of Textiles; Meliaceae -other; Sapotaceae; ... **3.0110**

I.A.R.

SORGHUM BREEDING ... Breeding & Genetics; Hybrid Breeding -nonspecific; Pedigree; Sorghum Vulgare (Grain); ...**9.0156**

AGRONOMIC FACTORS INFLUENCING SORGHUM PRODUCTION ... Fallowing; Management; Sorghum Vulgare (Grain); Timing of Application -other; Timing of Planting Procedures; ...**9.0157**

SORGHUM CROP PROTECTION ... Cereal Crops; Rearing of Insects; Scrophulariaceae; Seedling Diseases -nonspecific; Smuts; Tettigonidae; ...**9.0159**

I.F.C.C.

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Ferric Acrisols; Geology; Growth Stage of Plant; Management; Nursery Observational Plots; Soil Types; ...**4.0001**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Ferric Acrisols; Magnesium; Nursery Observational Plots; ...**4.0002**

STUDY OF THE RESPONSE OF ELITE HYBRID CACAO-TREES TO MINERAL FERTILIZATION ... Management; Solar Light; ...**4.0003**

GENERATIVE IMPROVEMENT OF THE CACAO-TREE ... Breeding & Genetics, Spice&Bev; Continuous Humid; Ferric Acrisols; Interspecific Cross; Intraspec. Genetic Relations; Management; Plant Resistance; ...**4.0004**

MINERAL FERTILIZATION OF COFFEE ... Ferralic Cambisols; Geology; Management; Soil Types; ...**4.0006**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Ferric Acrisols; Magnesium; Nursery Observational Plots; Two Humid Seasons-7 Month,Plus; ...**4.0007**

IMPROVEMENT OF THE COLA TREE - COLA NITIDA ... Breeding & Genetics, Spice&Bev; Cola; Ferralic Cambisols; Ferric Acrisols; Intraspec. Genetic Relations; Nursery Observational Plots; Two Humid Seasons-7 Month,Plus; ...**4.0008**

GENERATIVE IMPROVEMENT OF THE CACAO TREE ... Breeding & Genetics, Spice&Bev; Ferric Acrisols; Intraspec. Genetic Relations; Plant Resistance; ...**4.0009**

STUDY OF THE RESPONSE OF ELITE HYBRID CACAO-TREES TO MINERAL FERTILIZATION ... Ferralic Cambisols; Ferric Acrisols; Management; Solar Light; Two Humid Seasons-7 Month,Plus; ...**4.0010**

IMPROVEMENT OF THE COFFEE-SHRUB (C.CANEPHORA) BY VEGETATIVE MEANS ... Breeding & Genetics, Spice&Bev; Ferralic Cambisols; Ferric Acrisols; Management; Two Humid Seasons-7 Month,Plus; ...**4.0011**

IMPROVEMENT OF COFFEE-SHRUBS BY INTRASPECIFIC HYBRIDATION ... Breeding & Genetics, Spice&Bev; Elevational Levels, Altitude; Ferralic Cambisols; Ferric Acrisols; Intraspec. Genetic Relations; Intraspecific Cross; Two Humid Seasons-7 Month,Plus; ...**4.0013**

I.R.A.T.

I.R.C.T.

Ministre Au Develop. Rural

National Network -general

O.A.U.

O.R.S.T.O.M.

SOIL MICROBIOLOGY ... Chlorinated Hydrocarbons; Ferralic Cambisols; Herbicides -nonspecific; Sulfur; Toxicity to Microorganisms; ...**9.0179**

A MICROBIOLOGICAL APPROACH TO GRASS/LEGUME COMPATIBILITY STUDIES ... Centrosema; Legume-grass Mixtures; Management; Proteins; Rhizobium; ...**9.0214**

THE EFFECT OF HERBICIDES ON RHIZOBIUM ACTIVITIES IN THE SOIL ... Continuous Humid 7 Months,Plus; Pesticidal Interaction -other; Pulse Crops; Simazine; Toxicity to Microorganisms; ...**9.0216**

A STUDY OF THE CONTRIBUTION OF FIXED NITROGEN TO THE NUTRITION OF COWPEA (VIGNA UNGUICULATA) ... Continuous Humid 7 Months,Plus; Inoculation; Pulse Crops; Rhizobium; ...**9.0218**

STUDIES ON THE ROLE OF SOIL MICROBES IN SOIL FERTILITY AND RICE CULTURE ... BHC; Management; Organic Fertility; Soil Microbiology; ...**10.0006**

FERTILIZER EFFICIENCY STUDIES ON SOYA BEAN AND GROUNDNUTS ... Glycine Max; Irrigation -general; Lime; Management; Nitrogen; Phosphorus; ...**11.0074**

Nitrogen Fixation

See Nitrogen Cycle

Nitrogen Gas

See Nitrogen

Nitrogen Metabolism

See Plant Physiology
Metabolism

Noctuidae

See Insecta
Lepidoptera

Nuclear Moisture Meters

REQUIREMENTS IN WATER OF IRRIGATED CROPS ... Bromeliaceae; Consumptive Use; Irrigation -general; Two Humid Seasons; ...**4.0091**

WATER REQUIREMENTS OF IRRIGATED CROPS ... Humid 1 Month; Irrigation -general; Management; Soil Moisture; ...**7.0002**

WATER USE EFFICIENCY OF MAIZE IN SOME NIGERIAN SOILS ... Evapotranspiration; Radioisotope Tracers; Soil Profile Studies; Soil-water-plant Relationships; ...**9.0193**

WATER REQUIREMENTS OF IRRIGATED CROPS ... Irrigation; Irrigation -general; Lysimeters; Management; Soil Moisture; Sorghum Vulgare (Grain); ...**11.0010**

Nucleic Acids & Precursors

Ribonucleic Acid

THE ROLE OF THE LUTOIDS IN THE PHYSIOLOGY AND THE FLOW OF THE LATEX OF HAVEA BRASILIENSIS ... Chromatography; Differential Centrifuge; Gel Electrophoresis; Industrial & New Crops; Latex; Membranes, Cellular; ...**4.0058**

Numidia

See Birds

Nursery Observational Plots

PROVENANCE TRIAL OF TEAK AND TERMINALIA IVORENSIS ... Silviculture; Tectona; Terminalia; Variation and Selection; ...**3.0083**

RAISING OF OIL PALM SEEDLINGS IN PRE-NURSERIES AND NURSERIES ... Blast; Continuous Humid 7 Months,Plus; Management; Planting Methods -other; ...**3.0118**

FUNGICIDE SPRAYING TRIALS IN NURSERY AND FIELD ... Cercospora; Economics of Chemical Control; Forturf; Mode of Action; Phytopathology; ...**3.0125**

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Ferric Acrisols; Geology; Growth Stage of Plant; Management; Soil Types; ...**4.0001**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Ferric Acrisols; Magnesium; ...**4.0002**

MINERAL FERTILIZATION OF COFFEE ... Ferralic Cambisols; Geology; Management; Soil Types; ...**4.0006**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Ferric Acrisols; Magnesium; Two Humid Seasons-7 Month,Plus; ...**4.0007**

IMPROVEMENT OF THE COLA TREE - COLA NITIDA ... Breeding & Genetics, Spice&Bev; Cola; Ferralic Cambisols; Ferric Acrisols; Intraspec. Genetic Relations; Two Humid Seasons-7 Month,Plus; ...**4.0008**

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Eutric Fluvisols; Geology; Growth Stage of Plant; Management; Soil Types; ...**4.0089**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Eutric Fluvisols; Magnesium; Soil Analysis -other; ...**4.0090**

FUSARIOSIS OF THE OIL PALM TREE - SELECTION OF RESISTANT MATERIAL ... Env. Plant Dis. Relation; Fungal Resistance; Fusarium; Inoculation; Phytopathology; Selfing; ...**4.0095**

MINERAL FERTILIZATION ON COFFEE ... Ferric Acrisols; Geology; Growth Stage of Plant; Management; Soil Types; Two Humid Seasons-7 Month,Plus; ...**4.0112**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Growth Stage of Plant; Management; Soil Analysis; Two Humid Seasons-7 Month,Plus; ...**4.0113**

IMPROVEMENT OF THE COLA TREE - COLA NITIDA ... Breeding & Genetics, Spice&Bev; Cola; Ferric Acrisols; Intraspec. Genetic Relations; Two Humid Seasons-7 Month,Plus; ...**4.0114**

IMPROVEMENT OF THE COLA TREE - COLA NITIDA ... Breeding & Genetics, Spice&Bev; Cola; Ferralic Arenosols; Intraspec. Genetic Relations; Two Humid Seasons; ...**4.0140**

MINERAL FERTILIZATION ON COFFEE ... Ferralic Arenosols; Geology; Growth Stage of Plant; Management; Soil Types; Two Humid Seasons; ...**4.0145**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Growth Stage of Plant; Management; Soil Analysis; Two Humid Seasons; ...**4.0146**

DISEASES OF LEAVES OF HEVEA IN NURSERY ... Foliage Diseases -nonspecific; Fungicides -nonspecific; Gloeosporium; Helminthosporium; Phytopathology; Two Humid Seasons; ...**4.0251**

OIL PALM - STUDY OF MINERAL BALANCES ... Greenhouses; Management; Mineralogy; Pesticides; ...**4.0296**

INFLUENCE OF THE MICROCLIMATE AND OF MINERAL FERTILIZATION ON NURSERIES OF OIL PALMS IN BAGS ... Blast; Interaction with Environment; Management; Nutritional Regulation (Host); Pricking Out; Temperature -air; ...**4.0300**

STUDY OF THE ROLE OF THE ANIONS SO4 AND CL IN THE FERTILIZATION OF THE COCONUT PALM ... Chlorine; Deficiencies; Nitrates; Sulfates; ...**4.0319**

STUDY FORMS OF NITROGENOUS FERTILIZERS FOR THE COCONUT PALM ... Cocos; Management; ...**4.0320**

STUDY THE RESISTANCE OF THE COCONUT PALM TO HELMINTHOSPORIOSIS ... Breeding & Genetics; Fungal Resistance; Inoculation; Phytopathology; Selfing; ...**4.0328**

MINERAL FERTILIZATION ON COFFEE ... Ferric Acrisols; Geology; Growth Stage of Plant; Management; Soil Types; Two Humid Seasons-7 Month,Plus; ...**4.0331**

MINERAL FERTILIZATION ON COCOA ... Calcium - Other Than Lime; Growth Stage of Plant; Management; Soil Analysis -other; ...**4.0335**

IMPROVEMENT OF THE COLA TREE ... Breeding & Genetics, Spice&Bev; Cola; Intraspec. Genetic Relations; ...**4.0341**

COMPARISON OF NURSERY TECHNIQUES FOR DALBERGIA AZADIRACTA INDICA AND CASSIA SIAMEA ... Cassia; Dalbergia; Humid 1 Month; Luvic Arenosols; Silviculture; Timing of Planting Procedures; ...**8.0016**

NURSERY EXPERIMENT WITH FOREST TREES ... Humid 1 Month; Luvic Arenosols; Silviculture; Sprinkler Irrigation; ...**8.0018**

NURSERY TECHNIQUES TRIAL FOR RICE ... Broadcast Application; Humid 6 Months; Management; Placement; Pregermination of Seeds; Transplanting Methods; ...**9.0007**

GERMINATION AND GROWTH STUDIES IN COCOA ... Germination; Management; ...**9.0116**

CASSAVA BREEDING ... Bacterial Wilt; Cercospora; Disease Resistance; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Phytopathology; ...**9.0182**

Nut Crops

See Horticulture

Nutrition in Disease

See Phytopathology

See Vertebrate Nutrition

Nutrition, Medical

Analysis of Food Nutrients

Malnutrition

Therapeutic Nutrition

Nutritional Regulation (Host)

See Pest Control Measures

Cultural Control

Nutritive Value of Food

See Food Science and Technology

Food Quality

Nutritive Values -animal

Nutritive Values -plant

Nuts

See Entomology, Applied

Horticulture Insects on

Nuts & Nutmeats

See Food Science and Technology

Odor & Taste

See Waste Treatment/Disposal

Off-shoot T

See Pesticides

Plant Growth Regulators

Oilseed Crops

See Agronomy

See Entomology, Applied

Agronomic Pests on

See Weeds

Control of Weeds in ...

Oilseed Product Development

See Utilization of Ag Wastes

Olacaceae

See Plants - Dicots

Olea

See Plants - Dicots

Oleaceae

Olethreutidae

See Insecta

Lepidoptera

Open Pollination

See Genetics

Genetic & Breeding Methods

Orange Tree Quick Decline

See Viruses, Plant

Orchidaceae

See Plants - Monocots

Organic Acids

THE DEVELOPMENT OF SEMI-FINISHED, FERMENTED, AND DEHYDRATED MAIZE MEAL ... Cereal Products; Dehydration; Fermentation; Organoleptic Studies of Food; Spoilage of Food; ...**3.0079**

THE ESTIMATION OF STARCH, DRY MATTER CONTENT AND HYDROGEN CYANIDE CONTENTS OF CASSAVA VARIETIES ... Chemical Analysis of Food; Fruits; Hydrogen Cyanide; Manihot; Root Crops; Starch; ...**9.0213**

CATION-ANION RELATIONSHIP IN THE OIL PALM ... Deficiencies; Movement, Availability; Oilseed Crops; Soil Analysis; Soil Types; ...**9.0297**

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES (2) ... Bacterial Resistance; Fruit Rot; Lycopersicum; Phytopathology; ...**14.0054**

Organic Fertility

SUITABILITY FOR RICE OF THE SOILS OF THE MARSHY LANDS OF NORTH DAHOMEY ... Continuous Humid; Humic Gleysols; Humid 4 Months; Management; Marsh; Timing of Application -other; ...**1.0001**

MAINTENANCE AND REGENERATION OF FERTILITY OF THE DEGRADED "TERRE DE BARRE" SOILS ... Dystric Nitosols; Humid 6 M.or Less; Soil Fertility; Source of Fertilizer; ...**1.0010**

TEST ON MAINTENANCE OF THE FERTILITY OF SOILS BY PROTECTION AND RESTITUTION OF ORGANIC MATTER ... Dystric Nitosols; Management; Organic Soils; Soil Fertility; ...**1.0029**

STUDIES ON YAMS WITH A VIEW TO THE INTEGRATION OF THIS CROP INTO AN INTENSIVE ROTATION ... Ferric Luvisols; Fertilizer Accumulation; Humid 5 Months; Management; ...**1.0031**

SUITABILITY FOR RICE OF THE SOILS OF THE MARSHY LANDS OF NORTH DAHOMEY ... Ferric Luvisols; Humid 5 Months; Management; Marsh; ...**1.0033**

STUDY OF THE MECHANISMS OF THE EVOLUTION OF SOILS AFTER CLEARING AND PUTTING UNDER CULTIVATION IN AN EQUATORIAL CLIMATE ... Dry Monsoon 4 M. or Less; Fallowing; Soil Genesis; ...**4.0040**

FOREST ECOLOGY IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Rain; Soil Minerals -natural; Surveys; ...**4.0050**

EVOLUTION OF THE SOILS OF BANANA PLANTATIONS. CULTIVATION IN ORGANIC SOILS ... Env. Plant Dis. Relation; Musa; Orthic Acrisols; Soil - Alkaline; Soil Drainage; ...**4.0153**

BALANCE OF MINERAL ELEMENTS UNDER CULTIVATION - MAINTENANCE FERTILIZATION ... Continuous Humid; Fertilizer Losses; Lysimeters; Removal of Nutrients from Soil; Soil Analysis; ...**4.0158**

BALANCE OF MINERAL ELEMENTS UNDER CULTIVATION - MAINTENANCE FERTILIZATION ... Ferralic Cambisols; Fertilizer Losses; Lysimeters; Removal of Nutrients from Soil; Soil Analysis; Two Humid Seasons-7 Month,Plus; ...**4.0213**

REGENERATION OF SOILS AND FERTILIZATION IN REPLANTATION OF OIL PALMS ... Cover Crops; Management; Tripsaceae -other; ...**4.0301**

STUDY OF THE SYSTEMS OF WORKING OF SOILS ... Fallowing; Management; Management Effects on Soils; Sorghum Vulgare (Grain); ...**6.0076**

THE SULPHUR AND ZINC STATUS OF SOILS OF THE WESTERN STATE OF NIGERIA ... Clay; Management; Movement, Availability; Soil pH; Sulfur; Zinc; ...**9.0051**

STUDIES ON SOIL ORGANIC MATTER ... Deficiencies; Management; Sulfur; ...**9.0123**

SOIL CHEMISTRY ... Fallowing; Iodine; Mineralogy; Silicon; Soil Resistance; ...**9.0178**

MEDIUM TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY RESTORATIVE POWERS OF MEDIUM DURATION FALLOWING ... Centrosema; Cynodon; Ferric Acrisols; Legume-grass Mixtures; Pueraria; ...**9.0250**

LONG TERM SOIL FERTILITY RESTORATIVE PROPERTIES OF NATURAL BUSH, TREE, GRASS AND LEGUME FALLOWS ... Crop Contribution to Soil Fert; Fallowing; Manihot; Orthic Ferralsols; Pueraria; Soil Analysis; ...**9.0366**

STUDIES ON THE ROLE OF SOIL MICROBES IN SOIL FERTILITY AND RICE CULTURE ... BHC; Management; Nitrogen Fixation; Soil Microbiology; ...**10.0006**

ACTION OF BURIED STRAW ON THE DYNAMICS OF SOILS ... Clay; Humid 2 Months; Loam - Sand Soil; Management; Soil Amendments; ...**11.0130**

C/N Ratio

SPECIFIC ROLE OF ORGANIC MATTER ... Dry Monsoon 4 M. or Less; Dystric Nitosols; Ferric Luvisols; Humid 4 Months; Plowing; Soil Fertility; ...**1.0002**

NITROGEN BALANCE IN TROPICAL SOILS ... Management; Sorghum Vulgare (Grain); ...**1.0008**

SPECIFIC ROLE OF ORGANIC MATTER ... Ferric Luvisols; Humid 5 Months; Plowing; Soil Fertility; ...**1.0034**

NITROGEN BALANCE IN TROPICAL SOILS ... Ferric Luvisols; Humid 5 Months; Management; Sorghum Vulgare (Grain); ...**1.0040**

COMPOSTING OF SAWDUST ... Compost; Lycopersicum; Management; Organic Soils; Sawdust Utilization; ...**3.0100**

ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR - BY CEREALS (RICE - MAIZE) ... Deficiencies; Irrigation -general; Nitrogen Metabolism; Proteins; ...**4.0196**

EVOLUTION OF NITROGEN IN CULTIVATED SOILS ... Continuous Humid; Nitrogen; Plant Residues -other; ...**4.0197**

SPECIFIC ROLE OF ORGANIC MATTER IN TROPICAL SOILS ... Ferralic Cambisols; Management; Sulfur; ...**4.0212**

ABSORPTION OF MINERAL ELEMENTS - NITROGEN IN PARTICULAR BY CEREALS (RICE-MAIZE) ... Ferralic Cambisols; Management; Plant Residues -other; Two Humid Seasons-7 Month,Plus; ...**4.0214**

EVOLUTION OF NITROGEN IN CULTIVATED SOILS ... Ferralic Cambisols; Nitrogen; Nitrogen Cycle; Plant Residues -other; Two Humid Seasons-7 Month,Plus; ...**4.0215**

SOIL ANALYSIS AND CLASSIFICATION ... Soil Analysis; ...**5.0023**

SPECIFIC ROLE OF ORGANIC MATTER IN SOILS, FERTILITY ... Humid 1 Month; Management; ...**6.0054**

STUDY OF THE NITROGENOUS FERTILIZATION OF CEREALS ... Humid 3 Months; Management; Sand; ...**8.0039**

RICE STRAW COMPOST TRIAL ... Compost; Humid 6 Months; ...**9.0005**

BIOLOGY AND PHYSIOLOGY OF PHYTOPHTHORA PALMIVORA ... Black Pod; Carbon; Nutrition in Disease; Phytopathology; Sterculiaceae -other; ...**9.0127**

SOIL MICROBIOLOGY ... Chlorinated Hydrocarbons; Ferralic Cambisols; Herbicides -nonspecific; Nitrogen Fixation; Sulfur; Toxicity to Microorganisms; ...**9.0179**

IMPROVEMENT OF THE NITROGENOUS FERTILITY OF THE SOIL BY APPLICATION OF ORGANIC NITROGEN ... Lysimeters; Manure; Plant Residues -other; Soil pH; ...**11.0057**

Compost

Green Manure

Manure

Plant Residues -other

Organic Soils

See Environments, Plant

Soil Composition

Organoleptic Studies of Food

See Food Science and Technology

Food Quality

Ornamentals

See Entomology, Applied

Horticulture Insects on

Orthic Acrisols

See Soil Unit Classification

Acrisols

Pasteurelloses
See Animal Pathology

Pathological Physiology
See Plant Physiology

Pathology -mammal
See Fish & Wildlife Biology
Mammals - Wildlife Studies

Pathology of Weeds
See Weeds

Pathology, Forest
See Forestry

Patoran
See Pesticides
Herbicides

Peanut Shells
See Feed Science and Technology
By-products- Plant(Vegetative)

Pectin
See Carbohydrates

Pedaliaceae
See Plants - Dicots

Pedigree
See Genetics
Population Genetic Relations

Pellic Vertisols
See Soil Unit Classification
Vertisols

Penicillin
See Antibiotics

Penicillium
See Fungi

Pentachlorophenol
See Pesticides
Multiple Usage Cpds.

Pentatomidae
See Insecta
Hemiptera

Peprothion
See Pesticides
Insecticides

Percolation
See Water Movement

Persea
See Plants - Dicots
Lauraceae

Persistance of Residues
See Pest Control Measures

Pest Control Measures
HELMINTHOSES OF FARM ANIMALS - EPIDEMIOLOGY ... Epidemiology of Disease; Population Dynamics; Veterinary Medicine; ...**11.0090**

ECOLOGICAL PARASITOLOGY ... Fish; Marine Animals; Population Dynamics; Taxonomy, Animal; ...**12.0002**

LEVEL OF PHYTOSANITARY PROTECTION ON COTTON ... Phytopathology; Plant Diseases; ...**14.0074**

LEVEL OF PHYTOSANITARY PROECTION ON COTTON ... Ferric Luvisols; Humid 6 Months; Phytopathology; Plant Diseases; Plinthic Luvisols; ...**14.0087**

Anti-transpirants
STUDY THE INFLUENCE OF THE DROUGHT FACTOR ON THE RESISTANCE OF RICE TO PIRICULARIOSIS ... Env. Plant Dis. Relation; Management; Phytopathology; Piriculariosis; ...**4.0189**

Biological Control
A STUDY OF THE ECOLOGY, BIOLOGY, & CONTROL OF THE GROUNDNUT SEED BEETLE ... Bruchidae; Host Preference, Host-insect; Insecticides -nonspecific; Oilseed Crops; ...**2.0007**

BIOLOGICAL CONTROL OF DISEASES OF THE ROOTS ... Cover Crops; Fomes; Ganoderma; Phytopathology; Two Humid Seasons; ...**4.0250**

TO CONTROL FIELD PESTS OF RICE - (I) EVALUATION OF DIFFERENT INSECTICIDES ... Cereal Crops; Crambidae; Insecticides -nonspecific; Integrated Control; Surveys; ...**9.0015**

Biocontrol -other
DISEASES OF THE ROOTS OF RUBBER TREES - CONTROL MEASURES AGAINST FOMES LIGNOSUS ... Fomes; Humidity; Phytopathology; Soil Moisture; ...**4.0249**

Disease -biocontrol
RESEARCH INTO METHODS FOR THE INTEGRATED CONTROL OF COTTON PESTS IN DAHOMEY ... Behavioral Ecology; Dystric Nitosols; Fiber Crops; Insect Viruses - other; Integrated Control; Olethreutidae; ...**1.0048**

INTEGRATED CONTROL OF CRYPTOPHLEBIA, BY ADDITION OF VIRUSES TO THE CHEMICAL INSECTICIDES ... Fiber Crops; Humid 6 M.or Less; Mode of Action; Peprothion; ...**1.0051**

BIOLOGICAL RESEARCH STUDIES ON MIRID OF COCOA - DISTANTIELLA THEOBROMAE ... Bacteria; Entomology, Physiology; Host Preference, Host-insect; Rearing of Insects; ...**4.0063**

BIOLOGICAL CONTROL OF CRYPTOPHLEBIA LEUCOTRETA ... Fiber Crops; Granulosis Viruses; Multiplication & Replication; Olethreutidae; Polyhedrosis Viruses; Rearing of Insects; ...**4.0277**

BIOLOGICAL CONTROL OF HELIOTHIS ARMIGERA ... Fiber Crops; Isolation of Viruses; Multiplication & Replication; Noctuidae; Polyhedrosis Viruses; Rearing of Insects; ...**4.0278**

CONTROL OF COSMOPHILIA FLAVA ... Bacillus; Fiber Crops; Insecticides -nonspecific; Thuricide; ...**4.0279**

CONTROL OF ORYCTES IN THE IVORY COAST ... Entomology, Physiology; Insect Attractants; Population Dynamics; Pueraria; ...**4.0327**

STUDY OF THE POSSIBILITIES OF BIOLOGICAL CONTROL OF RICE PESTS ... Bacillus; Insecta; Population Dynamics; Thuricide; ...**11.0136**

Klendusity
STUDY THE ATTRACTIVITY OF PLANT MATERIAL TO THE NOCTURNAL MOTH OF THE CACAO-TREE - EARIAS BIPLAGA ... Beverage Crops; Host Preference, Host-insect; Insect Resistance; Noctuidae; ...**4.0134**

STUDY THE ROTTING DISEASES OF COTTON PODS IN IRRIGATED CULTIVATION ... Fungal Resistance; Manage-

Consumer Attitudes, Awareness,

Cultural Control

Interaction with Environment

STRENGTHENING THE RESISTANCE OF CACAO-TREES TO THE BLACK PODS DUE TO PHYTOPHTHORA PALMIVORA ... Black Pod; Env. Plant Dis. Relation; Phytophthora; Shade; ...**4.0139**

INFLUENCE OF THE MICROCLIMATE AND OF MINERAL FERTILIZATION ON NURSERIES OF OIL PALMS IN BAGS ... Blast; Management; Nutritional Regulation (Host); Pricking Out; Temperature -air; ...**4.0300**

THE OIL PALM BLAST DISEASE AND ITS CONTROL ... Benlate; Breeding & Genetics; Fungal Resistance; Irrigation -general; Rhizoctonia; Terrachlor; Vapam; ...**9.0327**

STUDY CHEMICAL WEEDING OF RICE GROWN IN THE RAINY SEASON ... Cereal Crops; Forbs (Broadleaf Herbs); Grasses or Sedges; Herbicides -nonspecific; Humid 4 Months; ...**11.0153**

Mode of Action

INTEGRATED CONTROL OF CRYPTOPHLEBIA, BY ADDITION OF VIRUSES TO THE CHEMICAL INSECTICIDES ... Disease -biocontrol; Fiber Crops; Humid 6 M.or Less; Peprothion; ...**1.0051**

FUNGICIDE SPRAYING TRIALS IN NURSERY AND FIELD ... Cercospora; Economics of Chemical Control; Forturf; Phytopathology; ...**3.0125**

BIOLOGICAL CONTROL OF DISEASES OF THE ROOTS ... Cover Crops; Fomes; Ganoderma; Phytopathology; Two Humid Seasons; ...**4.0250**

STUDY THE DISINFECTION OF SEEDS ... Benlate; Mercury; Phytotoxicity; Seed Treatment; Vitavax; ...**4.0274**

ACTION OF GROWTH-REGULATORS ON THE COTTON PLANT - SUBSTANCES WHICH INHIBIT GIBBERELLINS ... Growth Retardation of Plants; Irrigation -general; Management; Parasite -other; Plant Growth Regulators; ...**4.0276**

Persistance of Residues

THE FATE AND POSSIBLE NUTRITIONAL AND TOXICOLOGICAL SIGNIFICANCE OF METHYL BROMIDE RESIDUES IN FUMIGATED COCOA BEANS ... Beverage Crops; Carbon; Industrial, Structural Insects; Methyl Bromide; Storage; ...**3.0216**

UTILIZATION OF HERBICIDES IN THE CULTIVATION OF COTTON ... Fiber Crops; Herbicides -nonspecific; ...**6.0078**

STUDIES ON THE ROLE OF SOIL MICROBES IN SOIL FERTILITY AND RICE CULTURE ... BHC; Management; Nitrogen Fixation; Organic Fertility; Soil Microbiology; ...**10.0006**

THE RESIDUAL EFFECTS OF HERBICIDES ... Environment Accumulation Rates; Ferric Luvisols; Field Crops -nonspecific; Herbicides -nonspecific; Humid 3 Months; ...**11.0145**

EXPERIMENT ON CHEMICAL WEEDING OF A COTTON PLANTATION WITH 3 HERBICIDE PREPARATIONS ... Cotoran; Fiber Crops; Pesticides -other; Preemerge Application; Surface -soil; ...**13.0049**

Pesticidal Interaction -other

THE EFFECT OF HERBICIDES ON RHIZOBIUM ACTIVITIES IN THE SOIL ... Continuous Humid 7 Months,Plus; Nitrogen Fixation; Pulse Crops; Simazine; Toxicity to Microorganisms; ...**9.0216**

Physical Control

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Cereal Crops; Irrigation -general; Management; Phenology, Life Cycle; Two Humid Seasons; ...**4.0093**

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Cereal Crops; Humid 5 Months; Irrigation -general; Management; Phenology, Life Cycle; ...**4.0209**

Attractants -physical

CONTROL OF ORYCTES IN THE IVORY COAST ... Entomology, Physiology; Insect Attractants; Population Dynamics; Pueraria; ...**4.0327**

Bait Traps

SEXUAL ATTRACTION IN CRYPTOPHLEBIA LEUCOTRETA ... Entomology, Applied; Insect Pheromones; Olethreutidae; ...**4.0280**

Barriers & Weirs

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Control of Nuisance Species; DDVP; Phosphorothioate Cpds.; Storage; Tenebrionidae; ...**3.0211**

STUDY OF RICE PESTS ... Cereal Crops; Insecta; Management; Rodentia -other; ...**5.0014**

CONTROL CAMPAIGN AGAINST TSETSE FLIES AND ANIMAL TRYPANOSOMIASES ... DDT; Muscidae; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**8.0021**

Burning or Flaming

INVESTIGATIONS INTO THE CONTROL OF SUGAR CANE NEMATODES ... Molasses; Phytopathology; Saccharum; Sugar Derivatives; ...**3.0129**

Habitat Manipulation-eradicate

CONTROL OF BLAST OF THE OIL PALM TREE ... Blast; Phytopathology; Rhizoctonia; ...**4.0096**

Light Traps

INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON ... Economics of Chemical Control; Gelechiidae; Noctuidae; Surveys; Trap Crops; ...**3.0132**

STUDY OF THE INSECTS THAT ARE HARMFUL TO RICE IN CASAMANCE ... Cereal Crops; Humid 2 Months; Insecta; Population Dynamics; Rearing of Insects; Surveys; ...**11.0138**

Mechanical Control

WEEDING OF PLUVIAL RICE, COMBINING CULTIVATION TECHNIQUES AND CHEMICAL HERBICIDE TREATMENTS ... Cereal Crops; Herbicides -nonspecific; Management; Placement; ...**4.0185**

DISEASES OF THE ROOTS OF RUBBER TREES - CONTROL MEASURES AGAINST FOMES LIGNOSUS ... Biocontrol -other; Fomes; Humidity; Phytopathology; Soil Moisture; ...**4.0249**

STUDY OF WEEDS IN IRRIGATED RICE ... Cereal Crops; Economics of Chemical Control; Herbicides -nonspecific; Management; ...**5.0016**

EMPERIMENT 17-1 WEED CONTROL IN OIL PALM PLANTATIONS ... Diuron; Hand Tillage; Oilseed Crops; Pest, Disease & Weed Control; ...**9.0301**

EXPERIMENT 17-2. MECHANICAL MAINTENANCE AND MULCHING TREATMENTS OF OIL PALM PLANTATIONS ... Cultcontrol -other; Equipment; Mulches; Pest, Disease & Weed Control; ...**9.0302**

CULTIVATION AND WEEDING METHODS IN PLANTATIONS ... Costs; Eucalyptus; Hand Tillage; Pinus; ...**9.0356**

Physcontrol -other

ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Habitat Studies; Population Dynamics; Rodenticides; ...**4.0059**

NEMATOLOGICAL STUDIES ON THE PARASITES OF YAMS, NOTABLY SCUTELLONEMA BRADYS ... Crop Rotation, Cropping System; Phytopathology; Surveys; Tylenchoidea; ...**4.0070**

STUDY OF RICE PESTS ... Barriers & Weirs; Cereal Crops; Insecta; Management; Rodentia -other; ...**5.0014**

Water

TREATMENT OF SUGARCANE PLANTING METHOD ... Dip Application; Management; Pesticides -other; Saccharum; Two Humid Seasons-7 Month,Plus; ...**3.0113**

Phytotoxicity

CONTROL OF WEEDS IN RICE ... Cereal Crops; Irrigation -general; Moisture Deficiency; Postemerge Application; Propanil; ...**3.0004**

WEED CONTROL IN COWPEA ... Management; Preforan; Pulse Crops; RP 17623; Trifluralin; ...**3.0008**

STUDY OF THE ACTION OF HERBICIDES IN THE CULTIVATION OF COTTON ... Fiber Crops; Herbicides -nonspecific; Management; ...**4.0267**

STUDY THE DISINFECTION OF SEEDS ... Benlate; Mercury; Seed Treatment; Vitavax; ...**4.0274**

OIL PALM - STUDY OF MINERAL BALANCES ... Greenhouses; Management; Mineralogy; Pesticides; ...**4.0296**

PRE-PLANTING HERBICIDE TRIAL ON RICE ... Dalapon; Grass -nonspecific; Humid 6 Months; Planavin; ...**9.0004**

Fungicides

Benlate

Borax

Bordeaux Mixture

Captan

Chloroneb

Dexon

Difolatan

Fore

Forturf

Fungicides -nonspecific

Herbicides

Insecticide - Acaricide

Insecticide - Antihelminth

Insecticide - Fumigant

Insecticide - Fungicide

Insecticides

Multiple Usage Cpds.

Nematocides

Pesticides -other

HERBICIDE EXPERIMENTATION ON COTTON ... Continuous Humid; ER 5461; GS 16068; MSMA; Postemerge Application; ...**1.0012**

HERBICIDE EXPERIMENTATION ON COTTON ... Dystric Nitosols; Fiber Crops; Humid 4 Months; Management; Preemerge Application; ...**1.0026**

EXPERIMENTS TO CONFIRM THE EFFICACY OF INSECTICIDE PREPARATIONS IN COTTON PLANTATIONS ... Endrin; Insecta; Peprothion; Phosvel; Thiodan; ...**1.0046**

TESTING OF NEW INSECTICIDE PREPARATIONS IN THE PROTECTION OF COTTON PLANTATIONS ... DDT; Fiber Crops; Insecta; Peprothion; Phosvel; Thiodan; Zectran; ...**1.0047**

INSECTICIDE EVALUATION TEST IN COTTON PLANTATIONS OF MIXTURES OF PROVEN INSECTICIDAL PREPARATIONS ... Dystric Nitosols; Endrin; Gardona; Humid 6 M.or Less; Synergism and Synergists; ...**1.0049**

TESTS OF CHEMICAL CONTROL OF WEEDS IN KENAF CROPS ... Dacthal; Fiber Crops; Monolinuron; Trifluralin; ...**1.0055**

PRESERVATION OF SMALL SIZED TIMBER AGAINST FUNGAL AND TERMITE ATTACK ... Fences; Osmosalts; Wood Preservation & Seasoning; ...**3.0109**

TREATMENT OF SUGARCANE PLANTING METHOD ... Dip Application; Management; Saccharum; Two Humid Seasons-7 Month,Plus; Water; ...**3.0113**

CHEMICAL WEED CONTROL IN SUGARCANE ... Fenac; Grasses or Sedges; Saccharum; Sugar Crops; ...**3.0116**

BIOLOGY AND CONTROL OF CEREAL STEM BORERS (LEPIDOPTERA) ... Continuous Humid 7 Months,Plus; Economics of Chemical Control; Multiple Cropping; Parasites - biocontrol; Sevin; ...**3.0136**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Damping Off; Seed Treatment; ...**3.0176**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Eutric Nitosols; Moist Monsoon 0 to 3 Months; Phytopathology; Soil-borne; ...**3.0205**

OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE ... Berenil; Management; Muscidae; Trypanosomiases; Veterinary Entomology; Veterinary Medicine; ...**5.0021**

INSECTICIDE TESTING PROGRAM ... Baytex; C 9491; Rainfall Surplus; Tenebrionidae; ...**9.0339**

AGRONOMIC STUDIES ON IRRIGATED, RAINFED LOWLAND AND UPLAND RICE ... Bentazon; D, 2,4-; Drought Resistance; Grass -nonspecific; Irrigation -general; Rain; ...**10.0001**

TRYPANOSOMIASES - TREATMENT ... Treatment; Trypanosoma; Trypanosomiases; Veterinary Medicine; ...**11.0093**

TESTING OF INSECTICIDAL PREPARATIONS ON GROWING COTTON PLANTS ... Endrin; Humid 3 Months; Peprothion; Thiodan; ...**11.0172**

EXPERIMENT ON CHEMICAL WEEDING OF A COTTON PLANTATION WITH 3 HERBICIDE PREPARATIONS ... Cotoran; Fiber Crops; Persistance of Residues; Preemerge Application; Surface -soil; ...**13.0049**

COMPARATIVE TRIAL OF CHEMICAL WEED-KILLERS IN COTTON PLANTATIONS ... Ferric Luvisols; Hand Tillage; Prometryne; ...**14.0086**

Petroleum Cpds. -nonspecific

FIELD CONTROL OF PHYTOPHTHORA PALMIVORA ON COCOA ... Black Pod; Fungicides -nonspecific; Phytophthora; ...**9.0128**

Phosphorothioate Cpds.

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Barriers & Weirs; Control of Nuisance Species; DDVP; Storage; Tenebrionidae; ...**3.0211**

Plant Growth Regulators

FERTILIZATION OF SMOOTH CAYENNE PINEAPPLE IN GHANA ... Bromeliaceae; Deficiencies; Magnesium; Management; Somatotrophin; Space Competition; ...**3.0171**

STIMULATION OF RUBBER TREES FOR EARLY PRODUCTION ... Growth Retardation of Plants; Harvest and Storage; Management; Sequential, Daily, Weekly, Etc; Two Humid Seasons; ...**4.0243**

TAPPING OF RUBBER TREES - RESEARCH ON THE EQUILIBRIUM BETWEEN YIELD BY THE HECTARE AND YIELD BY WORKER ... Costs; Harvest and Storage; Management; Supply; Time & Motion Studies; Two Humid Seasons; ...**4.0245**

CONTROL OF DISEASES OF THE TAPPING PANEL OF HEVEA ... Env. Plant Dis. Relation; Fungicides -nonspecific; Management; Phytopathology; Phytophthora; Two Humid Seasons; ...**4.0252**

ACTION OF GROWTH-REGULATORS ON THE COTTON PLANT - SUBSTANCES WHICH INHIBIT GIBBERELLINS ... Growth Retardation of Plants; Irrigation -general; Management; Mode of Action; Parasite -other; ...**4.0276**

STUDIES ON FLOWERING AND POD PRODUCTION IN KOLA (C. NITIDA) ... Cola; Management; Timing of Application; ...**9.0139**

MECHANISM OF DORMANCY IN THE SEED OF THE OIL PALM ... Dormancy; Germination; Growth Substances; Management; Scarification; ...**9.0328**

B9

STUDY ON THE UTILIZATION OF GROWING SUBSTANCES IN COCOA CROPPING ... Ferralic Arenosols; Fruit-set or Fruit-thinning; Growth Retardation of Plants; Management; Two Humid Seasons; ...**4.0132**

Ethrel

STUDY ON THE UTILIZATION OF GROWTH SUBSTANCES IN COFFEE CROPPING ... Ferralic Arenosols; Fruit-set or Fruit-thinning; Growth Retardation of Plants; Management; Two Humid Seasons; ...**4.0133**

ETHREL STIMULATION OF HEVEA VARIETIES ... D, 2,4-; Management; ...**5.0002**

BLACK THREAD CONTROL WITH DIFOLATAN AND ETHREL ... Black Thread; Difolatan; Latex; Phytopathology; Phytophthora; ...**5.0009**

COFFEE AGRONOMY PROJECT ... Beverage Crops; Fruit-set or Fruit-thinning; Management; Mulches; Shade; Space Competition; ...**9.0145**

USE OF GROWTH REGULATORS IN COFFEE HUSBANDRY ... Germination; Management; Preharvest Application; Thiourea; ...**9.0146**

IBA

PREPARATION OF PLANT MATERIAL FROM HEVEA FOR PROPAGATION - UTILIZATION OF GROWTH SUBSTANCES ... Breeding & Genetics; Growth and Differentiation; Growth Substances; Hormones; Management; Two Humid Seasons; ...**4.0237**

Maleic Hydrazide

TOBACCO SUCKER CONTROL WITH CHEMICALS ... Continuous Humid 7 Months,Plus; Growth Retardation of Plants; Management; Nicotiana; Off-shoot T; ...**3.0148**

Off-shoot T

TOBACCO SUCKER CONTROL WITH CHEMICALS ... Continuous Humid 7 Months,Plus; Growth Retardation of Plants; Maleic Hydrazide; Management; Nicotiana; ...**3.0148**

Rodenticides

ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Habitat Studies; Population Dynamics; ...**4.0059**

Triazines -nonspecific

CHEMICAL WEED CONTROL IN PLANTATIONS, NURSERIES AND FIRE LANES ... Dalapon; Economics of Chemical Control; Forbs (Broadleaf Herbs); Grasses or Sedges; Nursery Observational Plots; ...**9.0357**

Wood Preservatives

SCREENING TEST OF SPECIES AND TWO PRESERVATIVES AGAINST MARINE BORERS ... Crustacea; Factors Affecting Insect Pop.; Insect Resistance; Lamellibranchiata; Marine Animals; Maturity & Growth Stages; ...**3.0095**

DIFFUSION-IMPREGNATION OF BUILDING TIMBER IN BORON-BASED PRESERVATIVE FORMULATIONS ... Boron; Wood; Wood Preservation & Seasoning; ...**3.0096**

EFFICACY OF PRESERVATIVES UNDER GHANAIAN CONDITIONS ... Chemical Materials; Wood; Wood Preservation & Seasoning; ...**3.0097**

TESTING NEW SPECIES FOR USE AS RAIL SLEEPERS ... Railroads; Wood; ...**3.0098**

FIELD TEST OF TREATED ROUND POSTS FOR FENCING ... Eucalyptus; Fencing; Tectona; Wood Preservation & Seasoning; ...**3.0099**

STUDY OF PROPERTIES AND CHARACTERISTICS OF NIGERIAN FOREST TIMBER SPECIES ... Drying; Fungal Resistance; Machining; Pathology, Forest; Plant Morphology; Wood Preservation & Seasoning; Wood Structure & Properties; ...**9.0095**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Physical Properties; Terminalia; Wood Preservation & Seasoning; Xylem; ...**9.0096**

THE SUITABILITY OF NIGERIAN TIMBERS FOR RAILWAY SLEEPERS ... Chemical Materials; Corrosion, Deterioration; Mechanical Properties; Railroads; Wood; ...**9.0104**

Creosote

PRESERVATION OF SMALL SIZED TIMBER AGAINST FUNGAL AND TERMITE ATTACK ... Fences; Osmosalts; Pesticides -other; Wood Preservation & Seasoning; ...**3.0109**

Osmosalts

PRESERVATION OF SMALL SIZED TIMBER AGAINST FUNGAL AND TERMITE ATTACK ... Fences; Pesticides -other; Wood Preservation & Seasoning; ...**3.0109**

Pests

See Economics

Losses or Benefits from ...

Petroleum Cpds. -nonspecific

See Pesticides

Pets

See Animal Husbandry

Phaseolus

See Plants - Dicots

Leguminosae

Phenology, Life Cycle

See Ecology, Plant

See Weeds

Phenotypes

See Genetics

Pheromones & Sex Attractants

Insect Pheromones

SEXUAL ATTRACTION IN CRYPTOPHLEBIA LEUCOTRETA ... Bait Traps; Entomology, Applied; Olethreutidae; ...**4.0280**

Phoenix

See Plants - Monocots

Palmae

Phosalone

See Pesticides

Insecticide - Acaricide

Phosphatase -nonspecific

See Enzymes

Phosphates

See Phosphorus

Phosphorothioate Cpds.

See Pesticides

Phosphorus

See Also Isotopes

Radioactive Isotopes

STUDY THE MINERAL NUTRITION OF OIL PALM ACCORDING TO THE PLANT MATERIAL ... Calcium; Deficiencies; Management; Sulfur; ...**4.0299**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON GROWTH ... Calcium; Growth Stage of Plant; Magnesium; Management; Nitrogen; Potassium; ...**5.0004**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON YIELD ... Calcium; Magnesium; Management; Nitrogen; Potassium; ...**5.0005**

THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF THE LAYING HEN ... Calcium; Chicken, Domestic; Egg Production; Inorganic Elements in Feeds; Management; Poultry Rations; ...**9.0021**

RHIZOSPHERE MICROFLORA CONTRIBUTION TO PHOSPHATE DISSOLUTION ... Continuous Humid 7 Months,Plus; Removal of Nutrients from Soil; Rhizosphere; Soil Bacteria; Soil Microbiology; ...**9.0255**

ANALYSIS OF SAP ... Deficiencies; Management; Nitrogen; Sand; ...**11.0058**

MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM) ... Calcium; Magnesium; Nitrogen; Potassium; Sorghum Vulgare (Grain); ...**11.0059**

STUDY OF MINERAL DEFICIENCY COMPLEXES ... Calcium; Forage, Pasture or Range; Inorganic Elements in Feeds; Management; Water Utilization -animal; ...**11.0082**

Phosphates

EXPERIMENTS WITH NATURAL PHOSPHATES OF ANECHO (TOGO) ... Calcium; Seasonal Application; Source of Fertilizer; ...**1.0022**

STUDY FORMS OF PHOSPHATE FERTILIZERS FOR THE COCONUT PALM ... Calcium; Cocos; Fertilizer Toxicity; Fluorine; Formulation, Fertilizer; Management; ...**4.0321**

INFECTIONS AND INTOXICATIONS ("TOXI-INFECTIONS") CAUSED BY ANEROBIC BACTERIA - BOTULISM ... Bacterial Toxins; Clostridia; Etiology; Pathology -mammal; Toxoid Vaccine; Water Environment; ...**11.0109**

EXPERIMENTS WITH FERTILIZERS IN PLANTATIONS OF EUCALYPTUS CAMALDULENSIS ... Eucalyptus; Potassium; Silviculture; Sulfates; Sulfur; ...**13.0019**

Phostoxin

See Pesticides

Insecticide - Fumigant

Phosvel

See Pesticides

Insecticides

Photography

DETERMINATION OF WEEDS AT THE SEEDLING AND YOUNG PLANT STAGES ... Continuous Humid; Handbooks; Phenology, Life Cycle; Taxonomy, Plant; ...**4.0187**

Aerial Photography

MAP OF THE NATURAL VEGETATION OF NIGERIA ... Floras; Mapping; Silviculture; Surveys; ...**9.0081**

STUDY OF NATURAL PASTURES - CARTOGRAPHY ... Forage Grasses; Mapping; Remote Sensing; River Basins; ...**11.0080**

CARTOGRAPHY OF THE AGRARIAN ACTIVITIES OF TOGO ... Geology; Remote Sensing; Soil Survey; Topographical Parameters-other; ...**13.0014**

RECONNAISSANCE AND EVALUATION OF THE SOILS OF TOGO ... Geology; Soil Survey; ...**13.0016**

Photoperiod
See Environments, Plant

Photoperiodism
See Plant Physiology
Metabolism

Photosynthesis
See Plant Physiology
Metabolism

Phoxim
See Pesticides
Insecticide - Acaricide

Phycitidae
See Insecta
Lepidoptera

Physical Control
See Pest Control Measures

Physical Properties
See Materials

Physiology of Weeds
See Weeds

Phytopathology
See Also Agronomy
Beverage Crops
Cereal Crops
Fiber Crops
Forage Grasses
Forage Legumes
Industrial & New Crops
Oilseed Crops
Pulse Crops
Sugar Crops
Tobacco Crops

See Also Horticulture
Condiment, Spice & Herb Crops
Fruits and Berries
Leafy & Fruit-type Vegetables
Root Crops
Vine,Shrub, Bramble Fruit Crop

Alternate Hosts
IDENTIFICATION OF DISEASES OF FOOD CROPS - MANIOC (CASSAVA) AND YAMS ... Electron Microscopy; Manihot; Phytopathology; Vectors; Viral Transmission; ... **4.0076**

SWEET POTATO ENTOMOLOGY ... Curculionidae; Economics of Chemical Control; Ferric Luvisols; Ipomoea; Vectors; ... **9.0188**

STUDIES ON THE HOST RANGE OF HELMINTHOSPORIUM ORYZAE ... Grass -nonspecific; Helminthosporium; Pathology of Weeds; ... **9.0278**

Env. Plant Dis. Relation
INVESTIGATIONS INTO THE SEED-BORNE MICROFLORA OF ECONOMIC CROPS OF GHANA ... Continuous Humid 7 Months,Plus; Light Quantity or Intensity; Phytopathology; Seed-borne; Temperature -air; ... **3.0130**

DETERMINATION OF THE TRIBES OF ORANGE RUST OF THE COFFEE-SHRUB IN THE IVORY COAST - CHARACTERIZATION OF THE RESISTANCE OF COFFEE-SHRUBS ... Hemileia; Light Quantity or Intensity; Rusts; ... **4.0064**

STUDY OF THE PARASITIC FUNGI OF MARSHLAND CROPS - ANNUAL AND GEOGRAPHICAL VARIATION OF THE MYCOFLORA ... Fungal Resistance; Hyphomycetes; Marsh; Surveys; ... **4.0066**

STUDY OF THE BIOLOGY OF HETERODERA ORYZAE, A TROPICAL NEMATODE, PARASITE OF INUNDATED RICE IN THE IVORY COAST ... Hatchability; Phytopathology; Tylenchoidea; ... **4.0069**

FUSARIOSIS OF THE OIL PALM TREE - SELECTION OF RESISTANT MATERIAL ... Fungal Resistance; Fusarium; Inoculation; Nursery Observational Plots; Phytopathology; Selfing; ... **4.0095**

ECOLOGICAL STUDY OF THE CACAO-TREE IN RELATION TO BLACK-POD ... Black Pod; Humidity; Phytopathology; ... **4.0136**

STRENGTHENING THE RESISTANCE OF CACAO-TREES TO THE BLACK PODS DUE TO PHYTOPHTHORA PALMIVORA ... Black Pod; Interaction with Environment; Phytophthora; Shade; ... **4.0139**

EVOLUTION OF THE SOILS OF BANANA PLANTATIONS. CULTIVATION IN ORGANIC SOILS ... Musa; Orthic Acrisols; Soil - Alkaline; Soil Drainage; ... **4.0153**

STUDY THE INFLUENCE OF THE DROUGHT FACTOR ON THE RESISTANCE OF RICE TO PIRICULARIOSIS ... Management; Phytopathology; Piriculariosis; ... **4.0189**

ANALYSIS OF THE RELATIVE INCIDENCE OF STRAINS OF PIRICULARIA ORYZAE IN RICE-FIELDS ... Continuous Humid; Inoculation; Phytopathology; Piricularia; Piriculariosis; ... **4.0193**

INFLUENCE OF THE PERIOD OF ARREST OF TAPPING RUBBER TREES UPON GROWTH, PRODUCTION AND TAPPING CUT DISEASES ... Harvest and Storage; Management; Phytopathology; Plant Diseases; Two Humid Seasons; ... **4.0246**

BIOLOGICAL CONTROL OF DISEASES OF THE ROOTS ... Cover Crops; Fomes; Ganoderma; Phytopathology; Two Humid Seasons; ... **4.0250**

CONTROL OF DISEASES OF THE TAPPING PANEL OF HEVEA ... Fungicides -nonspecific; Management; Phytopathology; Phytophthora; Plant Growth Regulators; Two Humid Seasons; ... **4.0252**

CASSAVA PATHOLOGY ... Bacterial Resistance; Breeding & Genetics; Diseases; Environments, Plant; Ferric Luvisols; Mosaic Viruses; Vectors; ... **9.0190**

DIURNAL AND SEASONAL PERIODICITY OF PYRICULARIA SPORES IN AIR ... Blast; Humidity; Low Temp. Above 0 C; Moisture Budgets; Piricularia; Piriculariosis; ... **9.0238**

STUDIES ON THE CHOANEPHORA CUCURBITARUM WET ROT OF AMARANTHUS VIRIDIS ... Choanephora; Environments, Plant; Fungal Resistance; Fungicides -nonspecific; Wet Rot; ... **9.0284**

STUDY OF THE MOLD DISEASES OF THE PANICLES OF SORGHUM ... Humidity; Molds; Plant Pathogenetic Fungi; Surveys; ... **11.0013**

EPIDEMIOLOGY OF PIRICULARIA CRYZAE - METHODS OF CONTROL ... Disease Resistance; Humid 4 Months; Phytopathology; Piricularia; Piriculariosis; Soil Environment - other; ... **11.0152**

Forecast Outbreak - Plant Dis.
INVESTIGATIONS ON THE CAPE ST. PAUL WILT DISEASE OF COCONUT ... Cocos; Disease Resistance; Moist Monsoon 0 to 3 Months; Surveys; Wilts; ... **3.0111**

IDENTIFICATION OF RACES OF PUCCINIA POLYSORA AND HELMINTHOSPORIUM MAYDIS THAT MAY BE VIRULENT TO NCBRB ... Blight Diseases; Fungal Resistance; Phytopathology; Rusts; ... **9.0241**

Interpathological Relationship
STUDY OF THE ROLE OF THE NEMATODE VECTORS OF VIRUS IN THE TRANSMISSION OF THE VIRUS DISEASE OF PANICUM MAXIMUM IN THE IVORY COAST ... Dorylaimoidea; Panicum; Plant Virus -general; Vectors; ... **4.0071**

PINEAPPLES - PHYTOSANITARY PROTECTION ... Bromeliaceae; Fruits and Berries; Horticultural Crops; Phytopathology; Two Humid Seasons; ... **4.0149**

Mineral Excess & Deficiency

THE FERTILIZATION OF RICE ... Ferric Luvisols; Humid 3 Months; Humid 4 Months; Management; Soil Minerals -natural; ...**6.0009**

Nutrition in Disease

STUDY OF THE COMPOSITION OF THE CORTEX OF THE PODS IN RELATION TO RESISTANCE TO BLACK-POD ... Black Pod; Deficiencies; Moisture Content -plants; Nutritional Regulation (Host); Phytopathology; Potassium; ...**4.0137**

YAM STORAGE TRIAL ... Harvest and Storage; Soft Rot; Trace Metals; ...**9.0042**

BIOLOGY AND PHYSIOLOGY OF PHYTOPHTHORA PALMIVORA ... Black Pod; Carbon; Phytopathology; Sterculiaceae -other; ...**9.0127**

INVESTIGATION INTO THE CAUSES OF YAM-TUBER ROTS ... Harvest and Storage; Mineralogy; Phytopathology; Storage Rot; Taxonomy, Plant; Tuber Rot; ...**9.0247**

EFFECT OF PLANT NUTRITION ON RESISTANCE AGAINST THE BROWN SPOT OF RICE CAUSED BY H. ORYZAE ... Brown Spot; Continuous Humid 7 Months,Plus; Fungal Resistance; Helminthosporium; Nutritional Regulation (Host); Phytopathology; ...**9.0281**

Plant Disease Transmission

STUDY THE RESISTANCE OF THE COCONUT PALM TO HELMINTHOSPORIOSIS ... Breeding & Genetics; Fungal Resistance; Inoculation; Phytopathology; Selfing; ...**4.0328**

Seed-borne

INVESTIGATIONS INTO THE SEED-BORNE MICROFLORA OF ECONOMIC CROPS OF GHANA ... Continuous Humid 7 Months,Plus; Env. Plant Dis. Relation; Light Quantity or Intensity; Phytopathology; Temperature -air; ...**3.0130**

FUNGAL DISEASE OF SEEDS AND SEEDLINGS ... Pathology, Forest; Silviculture; Storage; Surveys; Viability; ...**9.0088**

DISEASES OF COFFEE IN NIGERIA ... Culturing Techniques; Fungicides -nonspecific; Phytopathology; Rusts; Screening Potential Pesticides; Surveys; ...**9.0148**

DETERMINATION OF SAPROPHYTIC SURVIVAL OF HELMINTHOSPORIUM ORYZAE IN RICE SEEDS AND STRAW ... Continuous Humid 7 Months,Plus; Helminthosporium; Phytopathology; ...**9.0279**

Soil-borne

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... Damping Off; Fungicides -nonspecific; Humid 7 Months; Phytopathology; Seed Treatment; ...**3.0071**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Damping Off; Pesticides -other; Seed Treatment; ...**3.0176**

INVESTIGATIONS OF FUNGICIDAL SEED DRESSING ... Damping Off; Dry Monsoon 5 Months, Plus; Fungicides -nonspecific; Phytopathology; Seed Treatment; ...**3.0197**

INVESTIGATIONS ON FUNGICIDAL SEED DRESSINGS ... BHC; Eutric Nitosols; Moist Monsoon 0 to 3 Months; Phytopathology; ...**3.0205**

IDENTIFICATION OF A VIRUS DISEASE OF PANICUM MAXIMUM ... Panicum; Phytopathology; Plant Virus -general; Vectors; Viral Transmission; ...**4.0074**

POPULATION DYNAMICS OF PLANT PARASITIC NEMATODES IN CULTIVATED SOIL ... Plant Nematodes -nonspecific; Population Dynamics; Taxonomy, Animal; ...**9.0044**

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Management; Plant Pathogenetic Fungi; Root Rot; Space Competition; Terminalia; ...**9.0086**

YAM BREEDING ... Breeding & Genetics; Disease Resistance; Ferric Luvisols; Nematode Resistance; Proteins; Starch; ...**9.0186**

YAMS PATHOLOGY ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferric Luvisols; Plant Nematodes -nonspecific; Shoe String; Storage Rot; ...**9.0192**

BIOLOGICAL CONTROL OF THE BROWN LEAF SPOT DISEASE OF RICE USING ORGANISMS ANTAGONISTIC TO THE PATHOGEN ... Brown Spot; Helminthosporium; Phytopathology; ...**9.0217**

RESISTANCE TO DISEASE IN THE OIL PALM ... Basal Rot; Breeding & Genetics; Disease Resistance; Fusarium; Phytopathology; Rhizoctonia; Vascular Wilt; ...**9.0314**

CONTROL OF THE OIL PALM VASCULAR WILT DISEASE ... Fungal Resistance; Fusarium; Fusarium Wilt; Inoculation; Phytopathology; ...**9.0324**

STUDY OF THE STUNTING OF GROUNDNUTS (CLUMP) ... Phytopathology; Plant Nematodes -nonspecific; Stunt Diseases; ...**11.0050**

Vectors

STUDY OF THE ROLE OF THE NEMATODE VECTORS OF VIRUS IN THE TRANSMISSION OF THE VIRUS DISEASE OF PANICUM MAXIMUM IN THE IVORY COAST ... Dorylaimoidea; Interpathological Relationship; Panicum; Plant Virus -general; ...**4.0071**

NEMATOLOGICAL STUDIES ON COTTON PLANTS AND DIFFERENT FIBRE PLANTS IN DAHOMEY ... Corchorus; Parakou Virus; Phytopathology; Surveys; Tylenchoidea; ...**4.0072**

IDENTIFICATION OF A VIRUS DISEASE OF PANICUM MAXIMUM ... Panicum; Phytopathology; Plant Virus -general; Soil-borne; Viral Transmission; ...**4.0074**

THE VIRUS DISEASES OF THE COTTON CROP IN WEST AND CENTRAL AFRICA ... Electron Microscopy; Mosaic Viruses; Phytopathology; Viral Transmission; Virus Resistance; ...**4.0075**

IDENTIFICATION OF DISEASES OF FOOD CROPS - MANIOC (CASSAVA) AND YAMS ... Electron Microscopy; Manihot; Phytopathology; Viral Transmission; ...**4.0076**

IDENTIFICATION OF VIRUSES OF MARKET GARDENING PLANTS IN THE IVORY COAST - GOMBO (OKRA), PASSION-FRUIT AND PEPPER ... Capsicum; Mosaic Viruses; Passiflora; Phytopathology; Plant Virus -general; Viral Transmission; ...**4.0077**

STUDY OF THE ADAPTATION OF CITRUS FRUIT TREES IN THE DIFFERENT CLIMATIC ZONES OF THE IVORY COAST ... Breeding & Genetics; Climate- Continental Sav.-Trop.; Fats & Oils; Fruits and Berries; Quality and Utilization; ...**4.0156**

THE COCOA SWOLLEN SHOOT VIRUS DISEASE PROJECT ... Beverage Crops; Insecta; Pathology of Weeds; Population Dynamics; Swollen Shoot Virus; Virulence and Pathogenicity; ...**9.0129**

CASSAVA ENTOMOLOGY ... Continuous Humid 7 Months,-Plus; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Pseudococcidae; ...**9.0187**

SWEET POTATO ENTOMOLOGY ... Curculionidae; Economics of Chemical Control; Ferric Luvisols; Ipomoea; ...**9.0188**

CASSAVA PATHOLOGY ... Bacterial Resistance; Breeding & Genetics; Diseases; Environments, Plant; Ferric Luvisols; Mosaic Viruses; ...**9.0190**

STUDIES ON THE BACTERIAL LEAF BLIGHT OF COWPEA (VIGNA UNGUICULATA (L) WALP) ... Blight Diseases; Diptera; Pulse Crops; Xanthomonas; ...**9.0215**

STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA) ... Bacterial Wilt; Insecta; Manihot; Phytopathology; Taxonomy, Plant; Xanthomonas; ...**9.0220**

BIOLOGY, ECOLOGY AND CONTROL OF VIRUS, FUNGAL AND BACTERIAL DISEASES OF RICE ... Bacterial Resistance; Blight Diseases; Nursery Observational Plots; Streaks; Virus Resistance; ...**10.0010**

VIRESCENCE (A DISEASE) OF THE COTTON PLANT ... Fiber Crops; Insecta -other; Phytopathology; Pleuropneumonia Group; Taxonomy, Animal; Virescence; ...**14.0077**

Surveys

INVESTIGATIONS ON THE CAPE ST. PAUL WILT DISEASE OF COCONUT ... Cocos; Disease Resistance; Forecast Outbreak - Plant Dis.; Moist Monsoon 0 to 3 Months; Wilts; ...**3.0111**

STUDY OF THE PARASITIC FUNGI OF MARSHLAND CROPS - ANNUAL AND GEOGRAPHICAL VARIATION OF THE MYCOFLORA ... Fungal Resistance; Hyphomycetes; Marsh; ...**4.0066**

NEMATOLOGICAL STUDIES ON THE PARASITES OF YAMS, NOTABLY SCUTELLONEMA BRADYS ... Crop Rotation, Cropping System; Physcontrol -other; Phytopathology; Tylenchoidea; ...**4.0070**

NEMATOLOGICAL STUDIES ON COTTON PLANTS AND DIFFERENT FIBRE PLANTS IN DAHOMEY ... Corchorus; Parakou Virus; Phytopathology; Tylenchoidea; Vectors; ...**4.0072**

COMPUTERIZATION OF ROUTINE DISEASE CONTROL WORK RECORDS - HEVEA PLANTATION ... Computer Usage; Phytopathology; ...**5.0008**

Symbionts, Plant Diseases

Virulence and Pathogenicity

Phytophthora

See Fungi

Phytotoxicity

See Pest Control Measures

Picornaviruses

See Viruses, Animal

RNA Viruses, Naked

Pinus

See Plants - Gymnosperms

Piperaceae

See Plants - Dicots

Piperazine

See Pesticides

Antihelminth

Piricularia

See Fungi

Piriculariosis

See Plant Diseases

Placement

See Fertilizer Technology

See Planting Methods

Planavin

See Pesticides

Herbicides

Plankton

Planosols

See Soil Unit Classification

Plant Absorption

See Pest Control Measures

Plant Disease Transmission

See Phytopathology

Plant Diseases

Anthracnose

Black Pod

Black Thread

Blast

Blight Diseases

Bronzing

Cankers

Chlorosis

Damping Off

CREATION OF EATING VARIETIES OF GROUNDNUTS FOR CASAMANCE ... Breeding & Genetics; Humid 4 Months; ...**11.0155**

RESEARCH FOR LATE VARIETIES OF GROUNDNUTS RESISTANT TO "ROSETTE" ... Disease Resistance; Hybrid Breeding -nonspecific; Phytopathology; ...**14.0016**

RESEARCH ON EARLY VARIETIES OF GROUNDNUTS RESISTANT TO ROSETTE ... Breeding & Genetics; Disease Resistance; Fats - Lipids & Oils; Phytopathology; ...**14.0025**

Rots

STUDY THE ROTTING DISEASES OF COTTON PODS IN IRRIGATED CULTIVATION ... Fungal Resistance; Klendusity; Management; Phytopathology; Planting Sequence or Method; Timing of Planting Procedures; ...**4.0275**

Basal Rot

RESISTANCE TO DISEASE IN THE OIL PALM ... Breeding & Genetics; Disease Resistance; Fusarium; Phytopathology; Rhizoctonia; Vascular Wilt; ...**9.0314**

THE CONTROL OF THE OIL PALM DRY BASAL ROT DISEASE ... Ceratocystis; Inoculation; Phytopathology; ...**9.0323**

Butt Rot

BUTT AND ROOT ROT OF TEAK (TECTONA GRANDIS) ... Fomes; Pathology, Forest; Root Rot; Tectona; ...**9.0361**

Fruit Rot

CONTROL MEASURES AGAINST PSEUDOMONAS SOLANACEARUM IN TOMATOES (2) ... Bacterial Resistance; Lycopersicum; Phytopathology; ...**14.0054**

Pod Rot

STUDY OF CRYPTOGAMIC DISEASES AND OF ROTTING DISEASES OF COTTON PODS IN SENEGAL ... Phytopathology; Surveys; ...**11.0176**

Root Rot

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Management; Plant Pathogenetic Fungi; Space Competition; Terminalia; ...**9.0086**

BIOLOGY OF CAUSAL ORGANISMS OF ROOT ROT OF PLANTATION TIMBER SPECIES ... Fungi; Pathology, Forest; Taxonomy, Plant; ...**9.0087**

SWEET POTATO PATHOLOGY ... Breeding & Genetics; Ferric Luvisols; Plant Parts Bank; ...**9.0191**

BUTT AND ROOT ROT OF TEAK (TECTONA GRANDIS) ... Butt Rot; Fomes; Pathology, Forest; Tectona; ...**9.0361**

Soft Rot

YAM STORAGE TRIAL ... Harvest and Storage; Nutrition in Disease; Trace Metals; ...**9.0042**

Storage Rot

SWEET POTATO PATHOLOGY ... Breeding & Genetics; Ferric Luvisols; Plant Parts Bank; Root Rot; ...**9.0191**

YAMS PATHOLOGY ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferric Luvisols; Plant Nematodes -nonspecific; Shoe String; ...**9.0192**

INVESTIGATION INTO THE CAUSES OF YAM-TUBER ROTS ... Harvest and Storage; Mineralogy; Nutrition in Disease; Phytopathology; Taxonomy, Plant; Tuber Rot; ...**9.0247**

DETERMINATION OF THE MODE OF FUNGICIDAL YAM TUBER PROTECTION ... Benlate; Captan; Phytopathology; Plant Pathogenetic Fungi; Tuber Rot; TBZ; ...**9.0248**

CONROL OF YAM STORAGE ROTS ... Benlate; Captan; Harvest and Storage; Phytopathology; Tuber Rot; TBZ; ...**9.0249**

ORIGINS OF MOULD ATTACK ON STORED COCOA BEANS ... Chocolate & Cocoa; Fermentation; Molds; Spoilage of Food; ...**9.0335**

Tuber Rot

INVESTIGATION INTO THE CAUSES OF YAM-TUBER ROTS ... Harvest and Storage; Mineralogy; Nutrition in Disease; Phytopathology; Storage Rot; Taxonomy, Plant; ...**9.0247**

DETERMINATION OF THE MODE OF FUNGICIDAL YAM TUBER PROTECTION ... Benlate; Captan; Phytopathology; Plant Pathogenetic Fungi; Storage Rot; TBZ; ...**9.0248**

CONROL OF YAM STORAGE ROTS ... Benlate; Captan; Harvest and Storage; Phytopathology; Storage Rot; TBZ; ...**9.0249**

Wet Rot

STUDIES ON THE CHOANEPHORA CUCURBITARUM WET ROT OF AMARANTHUS VIRIDIS ... Choanephora; Env. Plant Dis. Relation; Environments, Plant; Fungal Resistance; Fungicides -nonspecific; ...**9.0284**

Russetting

GROUNDNUT IMPROVEMENT PROGRAMME ... Disease Resistance; Fats - Lipids & Oils; Management; Seed Production; Seed Treatment; ...**2.0005**

Rusts

DETERMINATION OF THE TRIBES OF ORANGE RUST OF THE COFFEE-SHRUB IN THE IVORY COAST - CHARACTERIZATION OF THE RESISTANCE OF COFFEE-SHRUBS ... Env. Plant Dis. Relation; Hemileia; Light Quantity or Intensity; ...**4.0064**

DISEASES OF COFFEE IN NIGERIA ... Culturing Techniques; Fungicides -nonspecific; Phytopathology; Screening Potential Pesticides; Seed-borne; Surveys; ...**9.0148**

IDENTIFICATION OF RACES OF PUCCINIA POLYSORA AND HELMINTHOSPORIUM MAYDIS THAT MAY BE VIRULENT TO NCBRB ... Blight Diseases; Fungal Resistance; Phytopathology; ...**9.0241**

ASSESSMENT OF THE LOSS IN YIELD ATTRIBUTABLE TO MAIZE RUST AND MAIZE BLIGHT ... Blight Diseases; Fungal Resistance; Helminthosporium; Phytopathology; Puccinia; ...**9.0242**

IMPROVEMENT OF THE LOCAL MATERIAL BY CUMULATIVE SELECTION - MAIZE ... Breeding & Genetics; Fungal Resistance; Lodging; Recurrent Selection; Scald; ...**14.0047**

PRODUCTION OF A LOCAL COMPOSITE OF MAIZE WITH BROADENED GENETIC VARIABILITY ... Breeding & Genetics; Fungal Resistance; Lodging; Recombination; Scald; ...**14.0049**

INTRODUCTION OF FOREIGN VARIETIES OF MAIZE ... Ferric Luvisols; Fungal Resistance; Humid 4 Months; Lodging; Management; ...**14.0050**

Scald

IMPROVEMENT OF SEMI-LATE AND LATE SORGHUMS BY HYBRIDATION BETWEEN LINES DESCENDED FROM SELECTION, AND FOREIGN MATERIAL ... Breeding & Genetics; Fungal Resistance; Humid 3 Months; Molds; Sorghum Vulgare (Grain); ...**14.0038**

IMPROVEMENT OF THE LOCAL MATERIAL BY CUMULATIVE SELECTION - MAIZE ... Breeding & Genetics; Fungal Resistance; Lodging; Recurrent Selection; ...**14.0047**

PRODUCTION OF A LOCAL COMPOSITE OF MAIZE WITH BROADENED GENETIC VARIABILITY ... Breeding & Genetics; Fungal Resistance; Lodging; Recombination; ...**14.0049**

IMPROVEMENT OF SEMI-LATE AND LATE SORGHUMS BY HYBRIDATION BETWEEN LINES DESCENDED FROM SELECTION, AND FOREIGN MATERIAL ... Breeding & Genetics; Fungal Resistance; Humid 4 Months; Molds; Sorghum Vulgare (Grain); ...**14.0059**

Seedling Diseases -nonspecific

SORGHUM CROP PROTECTION ... Cereal Crops; Rearing of Insects; Scrophulariaceae; Smuts; Tettigonidae; ...**9.0159**

Smuts

DEVELOPMENT OF MEDIUM MATURING, SHORT STATURE, HIGH YIELDING SORGHUM VARIETIES OF ACCEPTABLE PALATABILITY AND RESISTANT TO PESTS & DISEASE ... Breeding & Genetics; Cecidomyiidae; Disease Resistance; Dry Monsoon 5 Months, Plus; Insect Resistance; Sorghum Vulgare (Grain); ...**3.0179**

THE DEVELOPMENT OF LATE MATURING, SHORT VARIETIES OF ACCEPTABLE PALATABILITY & RESISTANT TO PESTS & DISEASE ... Breeding & Genetics; Cecidomyiidae; Disease Resistance; Dry Monsoon 5 Months, Plus; Insect Resistance; Sorghum Vulgare (Grain); ...**3.0184**

CEREAL BREEDING - PEARL MILLET ... Breeding & Genetics; Ergot; Humid 3 Months; Phytopathology; ...**6.0040**

SORGHUM CROP PROTECTION ... Cereal Crops; Rearing of Insects; Scrophulariaceae; Seedling Diseases -nonspecific; Tettigonidae; ...**9.0159**

SURVEY AND ASSESSMENT OF THE SMUT AND BLAST DISEASES OF SUGARCANE ... Blast; Fungal Resistance; Phytopathology; Saccharum; Surveys; Ustilaginales; ...**9.0240**

Spots

Brown Spot

BIOLOGICAL CONTROL OF THE BROWN LEAF SPOT DISEASE OF RICE USING ORGANISMS ANTAGONISTIC TO THE PATHOGEN ... Helminthosporium; Phytopathology; Soil-borne; ...**9.0217**

IDENTIFICATION OF RICE VARIETIES RESISTANT TO THE BROWN SPOT OF RICE CAUSED BY HELMINTHOSPORIUM ORYZAE ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Fungal Resistance; Helminthosporium; Phytopathology; ...**9.0277**

FIELD CONTROL OF THE BROWN SPOT OF RICE USING FUNGICIDES ... Continuous Humid 7 Months,Plus; Fungicides -nonspecific; Maturity or Growth Stage; Phytopathology; ...**9.0280**

EFFECT OF PLANT NUTRITION ON RESISTANCE AGAINST THE BROWN SPOT OF RICE CAUSED BY H. ORYZAE ... Continuous Humid 7 Months,Plus; Fungal Resistance; Helminthosporium; Nutrition in Disease; Nutritional Regulation (Host); Phytopathology; ...**9.0281**

Leaf Spot

THE INTRODUCTION AND SELECTION OF HIGH YIELDING VARIETIES OF GROUNDNUTS PROCESSING HIGH OIL CONTENT FOR NORTHERN GHANA ... Breeding & Genetics; Cercospora; Dry Monsoon 5 Months, Plus; Fats - Lipids & Oils; Management; Rosette Disease; ...**3.0185**

FUNGICIDAL SPRAYING AND LEAF PRUNING TRIAL FOR THE CONTROL OF CERCOSPORA LEAF SPOT ... Cercospora; Fungicides -nonspecific; Phytopathology; ...**9.0325**

CONTROL OF CERCOSPORA LEAF SPOT OF THE OIL PALM ... Breeding & Genetics; Cercospora; Fore; Fungal Resistance; Phytopathology; ...**9.0326**

CONTINUOUS CROP ROTATION WITH MANURE ... Cercospora; Chlorosis; Fallowing; Management; Manure; Phytopathology; ...**14.0014**

Streaks

CREATION OF A VARIETAL HYBRID OF YELLOW MAIZE ADAPTED TO THE NORTH OF DAHOMEY ... Breeding & Genetics; Ferric Luvisols; Humid 5 Months; Plant Virus -general; Virus Resistance; ...**1.0043**

BIOLOGY, ECOLOGY AND CONTROL OF VIRUS, FUNGAL AND BACTERIAL DISEASES OF RICE ... Bacterial Resistance; Blight Diseases; Nursery Observational Plots; Vectors; Virus Resistance; ...**10.0010**

Stunt Diseases

NEMATOLOGICAL STUDY OF CHLOROSIS OF LEGUMINOUS PLANTS AND OF STUNTING ("CLUMP") OF GROUNDNUTS IN UPPER VOLTA ... Cajanus; Chlorosis; Leguminosae -other; Phytopathology; Tylenchoidea; ...**4.0073**

THE INCIDENCE AND EXTENT OF DAMAGE DONE TO COWPEAS BY THE LEAFHOPPER EMPOASCA DOLICHII ... Chlorosis; Insecticides -nonspecific; Pests; Pulse Crops; Undesired Results; ...**9.0268**

STUDY OF THE STUNTING OF GROUNDNUTS (CLUMP) ... Phytopathology; Plant Nematodes -nonspecific; Soil-borne; ...**11.0050**

CONTROL OF STUNTING OF THE GROUNDNUT PLANT - CLUMP ... Humid 3 Months; Nemagon; Phytopathology; Plant Nematodes -nonspecific; ...**14.0022**

Virescence

VIRESCENCE (A DISEASE) OF THE COTTON PLANT ... Fiber Crops; Insecta -other; Phytopathology; Pleuropneumonia Group; Taxonomy, Animal; Vectors; ...**14.0077**

Wilts

INVESTIGATIONS ON THE CAPE ST. PAUL WILT DISEASE OF COCONUT ... Cocos; Disease Resistance; Forecast Outbreak - Plant Dis.; Moist Monsoon 0 to 3 Months; Surveys; ...**3.0111**

EVALUATION OF CERTAIN FUNGICIDES FOR THE CONTROL OF SCLEROTIUM WILT DISEASE CAUSED BY SCLEROTIUM ROLFSII ON VEGETABLES AND LEGUMES ... Continuous Humid 7 Months,Plus; Lycopersicum; Sclerotium; Selectivity of Pesticides; ...**3.0131**

INTRODUCTION OF EXOTIC PLANTS ... Cocos; Disease Resistance; Insect Resistance; Phenology, Life Cycle; Plant Parts Bank; Triticum; ...**3.0208**

STUDY ON MANUAL POLLINATION AND FERTILIZATION OF THE CACAO-TREE AND THE INFLUENCE OF A COMPLEMENTARY MANUAL POLLINATION ... Breeding & Genetics, Spice&Bev; Ferric Acrisols; Pollination & Fertilization; Two Humid Seasons-7 Month,Plus; ...**4.0098**

STUDY ON MANUAL POLLINATION AND FERTILIZATION OF THE CACAO-TREE AND OF THE INFLUENCE OF A COMPLEMENTARY MANUAL POLLINATION ... Breeding & Genetics, Spice&Bev; Ferralic Arenosols; Pollination & Fertilization; Two Humid Seasons; ...**4.0117**

PINEAPPLES - PHYTOSANITARY PROTECTION ... Bromeliaceae; Fruits and Berries; Horticultural Crops; Phytopathology; Two Humid Seasons; ...**4.0149**

Bacterial Wilt

CASSAVA BREEDING ... Cercospora; Disease Resistance; Ferric Luvisols; Insect Resistance; Mosaic Viruses; Phytopathology; ...**9.0182**

CASSAVA PATHOLOGY ... Bacterial Resistance; Breeding & Genetics; Diseases; Environments, Plant; Ferric Luvisols; Mosaic Viruses; Vectors; ...**9.0190**

STUDIES ON THE BACTERIAL DISEASES OF CASSAVA (MANIHOT UTILISSIMA) ... Insecta; Manihot; Phytopathology; Taxonomy, Plant; Vectors; Xanthomonas; ...**9.0220**

STUDIES ON THE BACTERIAL WILTS OF SOLANACEOUS VEGETABLES ... Phytopathology; Pseudomonas -nonspecific; Solanaceae -other; Virulence and Pathogenicity; ...**9.0221**

Cherelle Wilt

INCREASING COCOA YIELDS BY PHYSIO-AGRONOMIC TECHNIQUES ... Management; Phytopathology; ...**9.0117**

Fusarium Wilt

RESISTANCE TO DISEASE IN THE OIL PALM ... Basal Rot; Breeding & Genetics; Disease Resistance; Fusarium; Phytopathology; Rhizoctonia; Vascular Wilt; ...**9.0314**

CONTROL OF THE OIL PALM VASCULAR WILT DISEASE ... Fungal Resistance; Fusarium; Inoculation; Phytopathology; Soil-borne; ...**9.0324**

Vascular Wilt

RESISTANCE TO DISEASE IN THE OIL PALM ... Basal Rot; Breeding & Genetics; Disease Resistance; Fusarium; Phytopathology; Rhizoctonia; ...**9.0314**

Yellow Dwarfing

THE MOST FAVOURABLE CROPPING TECHNIQUES FOR THE NODULATION OF GROUNDNUTS ... Fats - Lipids & Oils; Inoculation; Lime; Management; Proteins; ...**11.0031**

Yellows

STUDIES ON THE OIL PALM PATCH YELLOWS ... Fungal Resistance; Fusarium; Inoculation; Phytopathology; ...**9.0322**

Plant Growth Regulators

See Pesticides

Plant Industries -other

See Ag Industries & Agribusiness

Plant Morphology

ROOT ECOLOGY OF KHAYA IN GHANA ... Khaya; Silviculture; Soil Analysis; ...**3.0063**

REPRODUCTIVE BIOLOGY OF KENAF ... Back Cross; Continuous Humid 7 Months,Plus; Management; Pollens; ...**3.0139**

COLLECTION AND CLASSIFICATION OF YAM CULTIVARS ... Breeding & Genetics; Genetics; Plant Parts Bank; ...**3.0159**

STUDY OF GROWTH AND OF RHYTHMIC DEVELOPMENT IN JOINTED PLANTS AND FLUSH PLANTS ... Biological Rhythms; Environments, Plant; Growth and Differentiation; Phenology, Life Cycle; ...**4.0048**

PHENOLOGY AND ECOLOGY OF THE SIPO (ENTANDROPHRAGMA UTIL) - RHYTHM OF GROWTH IN NATURAL FOREST ... Climate- Humid Equatorial; Dendrochronology; Meliaceae -other; Phenology, Life Cycle; ...**4.0083**

MAINTENANCE OF A WORKING COLLECTION FOR INUNDATED RICE-FIELDS ... Breeding & Genetics; Continuous Humid; Plant Parts Bank; ...**4.0165**

MAINTENANCE OF A WORKING COLLECTION FOR IRRIGATED RICE ... Breeding & Genetics; Continuous Humid; Plant Parts Bank; ...**4.0166**

IMPROVEMENT OF HEVEA BRASILIENSIS - RESEARCH ON CRITERIA FOR SELECTION ... Breeding & Genetics; Latex; Laticifers; Two Humid Seasons; Wind; Wind or Air Movement; ...**4.0228**

STUDY OF PROPERTIES AND CHARACTERISTICS OF NIGERIAN FOREST TIMBER SPECIES ... Drying; Fungal Resistance; Machining; Pathology, Forest; Wood Preservation & Seasoning; Wood Structure & Properties; ...**9.0095**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Physical Properties; Terminalia; Wood Preservation & Seasoning; Xylem; ...**9.0096**

PHYSIOLOGY OF ROOT, TUBER CROPS AND VEGETABLES ... Breeding & Genetics; Ferralic Cambisols; Ipomoea; ...**9.0162**

IDOLATRICA CHARACTER (OIL PALM) ... Breeding & Genetics; Hybrid Breeding -nonspecific; Phenotypes; ...**9.0287**

Plant Nematodes -other

See Aschelminthes

Nematoda

Plant Parts Bank

See Banks and Reference Standards

Plant Pathogenetic Fungi

See Fungi

Plant Physiology

STUDY OF THE RESISTANCE TO DROUGHT OF THE OIL PALM ... Catalase; Drought Resistance; Management; Two Humid Seasons; ...**1.0079**

Absorption

STUDIES ON THE NUTRITION OF GROUNDNUTS (ARACHIS HYPOGEA L.) ... Deficiencies; Management; Nitrogen; Placement; ...**3.0225**

OIL PALM - STUDY OF MINERAL BALANCES ... Greenhouses; Management; Mineralogy; Pesticides; ...**4.0296**

STUDY THE ROOT SYSTEM OF THE OIL PALM ... Breeding & Genetics; Cell Wall; Extract Composition; Management; Plant Resistance; Tannin; ...**4.0297**

THE SOIL-PLANT SYSTEM IN RELATION TO THE INORGANIC NUTRITION OF HERBAGE GRASSES IN NIGERIA GRASS-LAND ASSOCIATIONS ... Management; Nitrogen; Placement; ...**9.0026**

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ...**9.0177**

APPLICATION OF RADIOTRACER TECHNIQUE IN THE DETERMINATION OF SOIL AVAILABLE PHOSPHORUS ... Continuous Humid 7 Months,Plus; Ferric Acrisols; Ferric Luvisols; Management; Movement, Availability; Phosphorus; ...**9.0253**

RHIZOSPHERE MICROFLORA CONTRIBUTION TO PHOSPHATE DISSOLUTION ... Continuous Humid 7 Months,Plus; Phosphorus; Removal of Nutrients from Soil; Rhizosphere; Soil Bacteria; Soil Microbiology; ...**9.0255**

EFFICIENCY OF FERTILIZER UPTAKE BY THE OIL PALM ... Management; Phosphorus; Placement; Rubidium; Soil Types; ...**9.0311**

PHYSIOLOGICAL BASIS FOR YIELD IN THE OIL PALM ... Carbon Dioxide; Oilseed Crops; Sugar -nonspecific; ...**9.0330**

THE UPTAKE AND DISTRIBUTION OF NUTRIENTS BY THE RICE PLANT ... Deficiencies; Management; Nitrogen; Translocation; ...**12.0008**

Aging

STUDY OF THE PHYSIOLOGICAL AGE OF THE TUBERS OF YAMS AND OF THEIR BUDDING ... Continuous Humid; Harvest and Storage; Management; ...**4.0179**

Biological Rhythms

STUDY OF GROWTH AND OF RHYTHMIC DEVELOPMENT IN JOINTED PLANTS AND FLUSH PLANTS ... Environments, Plant; Growth and Differentiation; Phenology, Life Cycle; Plant Morphology; ...**4.0048**

Dormancy

STUDY OF THE PHYSIOLOGICAL MECHANISM OF TUBER FORMATION IN A TROPICAL ENVIRONMENT ... Deficiencies; Growth and Differentiation; Orchidaceae; Photoperiod; Root Crops; Thermoperiod; ...**4.0049**

STUDY OF THE DORMANCY OF WEED SEEDS ... Continuous Humid; Physiology of Weeds; Scarification; ...**4.0186**

STUDY OF THE DORMANCY OF THE WILD VARIETIES OF RICE, O. BREVILIGULATA AND O. LONGISTAMINATA ... Non-dry 3 Months, Plus; Physiology of Weeds; Soil Depth; ...**6.0064**

MECHANISM OF DORMANCY IN THE SEED OF THE OIL PALM ... Germination; Growth Substances; Management; Plant Growth Regulators; Scarification; ...**9.0328**

Drought

BIOCHEMISTRY OF THE RESISTANCE OF THE COTTON PLANT TO DROUGHT ... Breeding & Genetics; Drought Resistance; Moisture Deficiency; ...**4.0055**

DEMONSTRATION OF SOME FACTORS OF RESISTANCE TO DROUGHT ... Cereal Crops; Continuous Humid; Drought Resistance; Epidermis; Hydrolytic Enzymes -general; Transpiration & Evaporation; ...**4.0171**

SPECIFIC EFFECTS OF THE FACTORS OF RESISTANCE TO DROUGHT IN RICE ... Cereal Crops; Continuous Humid; Drought Resistance; Moisture Deficiency; ...**4.0173**

Grafting

VEGETATIVE IMPROVEMENT OF HEVEA - REDUCTION OF THE INTERCLONAL VARIABILITY ... Breeding & Genetics; Two Humid Seasons; ...**4.0229**

Growth and Differentiation

STUDY OF GROWTH AND OF RHYTHMIC DEVELOPMENT IN JOINTED PLANTS AND FLUSH PLANTS ... Biological Rhythms; Environments, Plant; Phenology, Life Cycle; Plant Morphology; ...**4.0048**

STUDY OF THE PHYSIOLOGICAL MECHANISM OF TUBER FORMATION IN A TROPICAL ENVIRONMENT ... Deficiencies; Dormancy; Orchidaceae; Photoperiod; Root Crops; Thermoperiod; ...**4.0049**

IMPROVEMENT OF HEVEA BRASILIENSIS - EARLY FLOWERING ... Breeding & Genetics; Management; Two Humid Seasons; ...**4.0231**

PREPARATION OF PLANT MATERIAL FROM HEVEA FOR PROPAGATION - UTILIZATION OF GROWTH SUBSTANCES ... Breeding & Genetics; Growth Substances; Hormones; IBA; Management; Two Humid Seasons; ...**4.0237**

GRAIN LEGUME PHYSIOLOGICAL INVESTIGATIONS ... Breeding & Genetics; Glycine Max; Management; Seed Bank; ...**9.0167**

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ...**9.0177**

SEEDLING SELECTION EXPERIMENT 33-13 (PLANTED 1966) ... Oilseed Crops; Sex Ratio; ...**9.0299**

EFFECT OF THE SIZE OF SEEDS ON SUBSEQUENT GROWTH AND YIELD - EXPERIMENT 9-8 (PLANTED 1970) ... Phytopathology; ...**9.0300**

RELATION OF FLOWERING TO YIELD IN THE OIL PALM ... Oilseed Crops; Reproductive Physiology; Sex Ratio; Silvex; ...**9.0331**

Metabolism

Carbohydrates

REGENERATION OF THE LATEX OF THE RUBBER TREE AFTER TAPPING ... Breeding & Genetics; Deficiencies; Harvest and Storage; Monosaccharides -nonspecific; Translocation; ...**4.0224**

SUGAR CONTENT OF PALM SAP ... Fermentation; Food Quality; Palmae; Sugar -nonspecific; Wine; ...**9.0319**

Drought Resistance

Fungal Resistance

Heat Resistance

Insect Resistance

Lodging

Nematode Resistance

Parasite -other

Shattering Resistance

Soil Resistance

Storage Changes

Virus Resistance

Weathering Resistance

Wind

Plant Responses

Irrigation

Plant Tissues

Endodermis

Epidermis

Laticifers

STUDY OF THE ORGANIC MITROGENOUS CONSTITUENTS OF THE LATEX OF HEVEA BRASILIENSIS ... Chromatography; Cytoplasm; Industrial & New Crops; Latex; Nitrogen Metabolism; ...**4.0056**

STUDY THE LUTOIDS OF THE LATEX OF THE RUBBER TREE - HEVEA ... Breeding & Genetics; Latex; Membranes, Cellular; Quality and Utilization; Two Humid Seasons; ...**4.0223**

IMPROVEMENT OF HEVEA BRASILIENSIS - RESEARCH ON CRITERIA FOR SELECTION ... Breeding & Genetics; Latex; Plant Morphology; Two Humid Seasons; Wind; Wind or Air Movement; ...**4.0228**

Meristems

SOME PHYSIOLOGICAL ASPECTS OF YAM PRODUCTION ... Management; ...**9.0043**

Parenchyma

A STUDY OF THE FACTORS AFFECTING THE RESISTANCE OF TERMINALIA IVORENSIS TO TERMINATE ATTACK ... Forestry Insects; Insect Resistance; Isoptera; Tensile Strength; Terminalia; ...**3.0235**

STUDY OF THE COMPOSITION OF THE CORTEX OF THE PODS IN RELATION TO RESISTANCE TO BLACK-POD ... Black Pod; Deficiencies; Moisture Content -plants; Nutritional Regulation (Host); Phytopathology; Potassium; ...**4.0137**

Sclerenchyma

Fibers

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Humid 7 Months; Management; ...**3.0067**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Humid 7 Months; Management; Seed Production; Surface -soil; ...**3.0068**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Humid 7 Months; Management; Timing of Planting Procedures; ...**3.0069**

DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE ... Breeding & Genetics; Insect Resistance; Photoperiod; Seed Bank; ...**3.0070**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA ... Humid 7 Months; Management; Timing of Planting Procedures; Urena; ...**3.0072**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS CAPSULARIS ... Corchorus; Humid 7 Months; Management; Timing of Planting Procedures; ...**3.0073**

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Continuous Humid 7 Months,Plus; Management; Retting; ...**3.0172**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Continuous Humid 7 Months,Plus; Retting; Surface -soil; ...**3.0173**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Continuous Humid 7 Months,Plus; Management; Timing of Planting Procedures; ...**3.0174**

DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE ... Breeding & Genetics; Disease Resistance; Insect Resistance; Photoperiod; Seed Bank; ...**3.0175**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA ... Continuous Humid 7 Months,Plus; Management; Timing of Planting Procedures; Urena; ...**3.0177**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS, CAPSULARIS ... Continuous Humid 7 Months,Plus; Corchorus; Management; Timing of Planting Procedures; ...**3.0178**

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HISBICUS CANNABINUS L. ... Dry Monsoon 5 Months, Plus; Management; ...**3.0193**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH, FIBRE AND SEED YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Dry Monsoon 5 Months, Plus; Management; Surface -soil; ...**3.0194**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Dry Monsoon 5 Months, Plus; Management; Timing of Planting Procedures; ...**3.0195**

DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE ... Breeding & Genetics; Dry Monsoon 5 Months, Plus; Insect Resistance; Photoperiod; Seed Bank; ...**3.0196**

EFFECTS OF DIFFERENT DATE OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA ... Dry Monsoon 5 Months, Plus; Management; Timing of Planting Procedures; Urena; ...**3.0198**

EFFECTS OF DIFFERENT DATES OF PLANTING OF THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS, CAPSULARIS ... Corchorus; Dry Monsoon 5 Months, Plus; Management; Timing of Planting Procedures; ...**3.0199**

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Eutric Nitosols; Management; Moist Monsoon 0 to 3 Months; ...**3.0201**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH FIBRE AND SEED YIELDS OF KENAF, HIBISCUS CANNABINUS L. ... Eutric Nitosols; Management; Moist Monsoon 0 to 3 Months; ...**3.0202**

EFFECTS OF DIFFERENT DATES OF PLANNING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Eutric Nitosols; Management; Moist Monsoon 0 to 3 Months; Timing of Planting Procedures; ...**3.0203**

DEVELOPMENT OF DISEASE AND PEST RESISTANT KENAF VARIETIES WITH A HIGH YIELD OF GOOD QUALITY FIBRE ... Breeding & Genetics; Eutric Nitosols; Insect Resistance; Nematode Resistance; Plant Nematodes -nonspecific; Selfing; ...**3.0204**

EFFECT OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA ... Eutric Nitosols; Management; Moist Monsoon 0 to 3 Months; Timing of Planting Procedures; Urena; ...**3.0206**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CARCHORUS, CAPSULARIS ... Corchorus; Eutric Nitosols; Management; Moist Monsoon 0 to 3 Months; Timing of Planting Procedures; ...**3.0207**

STUDY OF THE ACTION OF TRACE ELEMENTS ON THE COTTON PLANT ... Hydroponic Studies; Management; ...**4.0268**

OBSERVATION OF THE CHARACTERS OF PRODUCTION OF THE COCONUT PALM ... Cocos; Copra; Fats - Lipids & Oils; Moisture Content -plants; ...**4.0317**

INTRASPECIFIC HYBRIDATION OF COTTON (G. BARBADENSE) ... Back Cross; Breeding & Genetics; Intraspecific Cross; Pedigree; ...**13.0035**

Vascular Tissue

Xylem

TAXONOMY, BIOLOGY AND CONTROL OF BORERS OF MELIACEAE ... Forestry Insects; Insecta -other; Meliaceae -other; Taxonomy, Animal; ...**9.0092**

STUDY OF PROPERTIES AND CHARÁCTERISTICS OF NIGERIAN FOREST TIMBER SPECIES ... Drying; Fungal Resistance; Machining; Pathology, Forest; Plant Morphology; Wood Preservation & Seasoning; Wood Structure & Properties; ...**9.0095**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Physical Properties; Terminalia; Wood Preservation & Seasoning; ...**9.0096**

NIGERIAN GROWN SPECIES FOR TRANSMISSION POLES ... Construction Materials; Electric Power Transmission; Nauclea; Wood; Wood Structure & Properties; ...**9.0099**

CONVERSION STUDIES ON A HORIZONTAL BANDSAW ... Forest Industry; Instrumentation, Equipment; Lumbering; Machining; Wood; ...**9.0100**

SURVEY OF WOOD DENSITY VARIATION OF SOME NIGERIAN TREE CROPS ... Gmelina; Moisture Content -plants; Tectona; Tree Breeding; Wood Structure & Properties; ...**9.0102**

CELLULOSE CONTENT OF NIGERIAN TIMBERS ... Cellulose; Gmelina; Terminalia; Triplochiton; Wood Structure & Properties; ...**9.0103**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ... **9.0105**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Khaya; Nauclea; Triplochiton; Wood Preservation & Seasoning; ...**9.0106**

Plant Virus -general

See Viruses, Plant

Planting Methods

PREPARATION OF PLANTING MATERIAL FOR HEVEA ... Management; Topographical Parameters-other; Two Humid Seasons; ...**4.0230**

STUDY OF THE POSSIBILITIES OF REPLANTING OF WOODLAND IN THE WESTERN CENTRE OF SENEGAL UTILIZING LOCAL FOREST SPECIES ... Chromic Vertisols; Fuel -wood; Humid 3 Months; Silviculture; ...**11.0119**

SILVICULTURAL RESEARCH WORK IN AN ARID ZONE - SILVICULTURE OF THE LOCAL SPECIES ... Gums and Resins; Luvic Arenosols; ...**11.0141**

Placement

COCONUT SPACING TRIAL ... Cocos; Continuous Humid; Management; Space Competition; ...**3.0042**

COCONUT DEPTH OF PLANTING TRIAL ... Cocos; Continuous Humid; Management; Soil Depth; ...**3.0043**

STUDY OF DENSITIES AND ARRANGEMENTS FOR PLANTATION OF THE CACAO-TREES ... Ferric Acrisols; Management; Space Competition; Two Humid Seasons-7 Month,Plus; ...**4.0100**

STUDY OF DENSITIES AND ARRANGEMENTS FOR PLANTATION OF THE CACAO-TREES ... Management; Space Competition; ...**4.0119**

WEEDING OF PLUVIAL RICE, COMBINING CULTIVATION TECHNIQUES AND CHEMICAL HERBICIDE TREATMENTS ... Cereal Crops; Herbicides -nonspecific; Management; ...**4.0185**

DETERMINATION OF THE OPTIMUM PLANTATION DENSITIES AND ARRANGEMENTS FOR RUBBER TREES ... Harvest and Storage; Management; Phytopathology; Space Competition; Two Humid Seasons; ...**4.0235**

STUDY OF DENSITY AND PLANTATION ARRANGEMENT FOR COCONUT PALM ... Cocos; Management; Space Competition; ...**4.0326**

STUDY OF THE DORMANCY OF THE WILD VARIETIES OF RICE, O. BREVILIGULATA AND O. LONGISTAMINATA ... Dormancy; Non-dry 3 Months, Plus; Physiology of Weeds; Soil Depth; ...**6.0064**

NURSERY TECHNIQUES TRIAL FOR RICE ... Broadcast Application; Humid 6 Months; Management; Nursery Observational Plots; Pregermination of Seeds; Transplanting Methods; ...**9.0007**

INVESTIGATION AND IMPROVEMENT OF NIGERIAN SEED MELON PRODUCTION ... Cucumis; Management; Timing of Planting Procedures; ...**9.0045**

FOREST TREES SPECIES TRIALS IN MOIST FOREST ... Silviculture; Soil Types; Space Competition; Variation and Selection; ...**9.0062**

ENRICHMENT OF NATURAL MOIST FOREST ... Silviculture; ...**9.0067**

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Management; Plant Pathogenetic Fungi; Root Rot; Space Competition; Terminalia; ...**9.0086**

MAIZE POPULATION STUDIES ... Continuous Humid 7 Months,Plus; Management; Space Competition; ...**9.0203**

EXPERIMENT ON PLANTATION DENSITY ... Management; Seeding or Planting Rate; Space Competition; Timing of Planting Procedures; ...**13.0044**

Planting Methods -other

RAISING OF OIL PALM SEEDLINGS IN PRE-NURSERIES AND NURSERIES ... Blast; Continuous Humid 7 Months,Plus; Management; Nursery Observational Plots; ...**3.0118**

CROPPING TECHNIQUES FOR IRRIGATED RICE ... Drill Application; Hot Equatorial or Hot Tropical; Management; Pricking Out; ...**8.0001**

STUDIES ON TREE CROP REHABILITATION ... Cola; Insecta; Management; Phytopathology; ...**9.0119**

EXPERIMENT 9-4 - POLYBAG NURSERY EXPERIMENT (FIELD STAGE) ... Management; Nursery Observational Plots; ...**9.0305**

EFFECT OF REMOVAL, PARTIAL REMOVAL AND NON-REMOVAL OF POLYTHENE POTS ON PLANTATION SPECIES ... Eucalyptus; Forestry Insects; Humid 4 Months; Isoptera; Pinus; Silviculture; ...**9.0348**

ESTABLISHMENT OF ACACIA NILOTICA AND ACACIA SENEGAL ... Humid 4 Months; Silviculture; ...**9.0352**

STUDY OF THE POSSIBILITIES OF REPLANTING WOODLAND IN THE WESTERN CENTRE OF SENEGAL UTILIZING EXOTIC SPECIES OF RAPID GROWTH ... Chromic Vertisols; Eucalyptus; Fuel -wood; Shelter Belts, Windbreaks; Soil Depth; ...**11.0118**

PHYTOTECHNICAL STUDIES ON METHODS OF PLANTATION OF CACAO-TREES ... Companion Cropping; Leguminosae -other; Management; Musa; Shade; ...**13.0022**

CULTIVATION TECHNIQUES FOR SESAME ... Management; Row Application; Sesamum; Side Dressing; ...**14.0021**

Pregermination of Seeds

NURSERY TECHNIQUES TRIAL FOR RICE ... Broadcast Application; Humid 6 Months; Management; Nursery Observational Plots; Placement; Transplanting Methods; ...**9.0007**

STUDY OF SEED-DISTRIBUTORS FOR RICE ... Design-,Modify,Develop.of Equip; Fertilizing, Planting & Cult; Management; ...**11.0122**

STUDY THE DIFFERENT SYSTEMS FOR CULTIVATION OF RICE ... Eutric Fluvisols; Eutric Gleysols; Hot Equatorial or Hot Tropical; Management; ...**11.0149**

Seeding or Planting Rate

CULTURAL TECHNIQUES FOR PRODUCTION OF FIBRES FOR SACKING ... Harvest and Storage; Insecticides -nonspecific; Retting; Soil Tillage; ...**6.0086**

TECHNIQUES FOR MULTIPLICATION OF THE SEEDS OF HIBISCUS SPECIES ... Fiber Crops; Herbicides -nonspecific; Management; Timing of Planting Procedures; ...**6.0088**

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Management; Plant Pathogenetic Fungi; Root Rot; Space Competition; Terminalia; ...**9.0086**

SEED RATE TRIAL WITH UPLAND RICE ... Continuous Humid 7 Months,Plus; Crop Production, Harvesting; Drill Application; Management; ...**9.0209**

EXPERIMENT ON PLANTATION DENSITY ... Management; Placement; Space Competition; Timing of Planting Procedures; ...**13.0044**

Timing of Planting Procedures

INTRODUCTION OF COTTON INTO TRADITIONAL CROP ROTATIONS ... Ferric Luvisols; Fertilizer Losses; Humid 6 Months; Management; Mineralogy; Soil Testing; ...**1.0024**

COTTON AGRONOMY ON THE BLACK SOILS, ACCRA PLAINS ... DDT; Formulation, Fertilizer; Preforan; Soil Moisture; Synergism and Synergists; ...**3.0005**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Fibers; Humid 7 Months; Management; ...**3.0069**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF URENA LOBATA ... Fibers; Humid 7 Months; Management; Urena; ...**3.0072**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS CAPSULARIS ... Corchorus; Fibers; Humid 7 Months; Management; ...**3.0073**

INVESTIGATIONS INTO BIONOMICS AND CONTROL OF INSECT PESTS ON COTTON ... Economics of Chemical Control; Gelechiidae; Noctuidae; Surveys; Trap Crops; ...**3.0132**

INVESTIGATIONS INTO THE BIONOMICS AND CONTROL OF INSECT PESTS ON SUGAR CANE ... Crambidae; Dip Application; Isoptera; Saccharum; Toxaphene; ...**3.0135**

EFFECT OF TIME OF LAND PREPARATION AND PLANTING ON YIELD QUALITY OF FLUE CURED TOBACCO ... Continuous Humid 7 Months,Plus; Management; Nicotiana; Plowing; Seedbed Preparation; Soil Tillage Methods -other; ... **3.0145**

Transplanting Methods

Planting Sequence or Method

See Pest Control Measures

Cultural Control

Plants - Dicots

Amaranthaceae

Amaranthus

Anacardiaceae

Anacardium

MANGO VARIETY MUSEUM ... Humid 7 Months; Management; Plant Parts Bank; ...**3.0066**

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopodiaceae; Guttiferae; Olea; Psidium; Sapindaceae; ...**5.0020**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Eutric Fluvisols; Humid 4 Months; Mangifera; Passiflora; Psidium; ...**6.0004**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid 1 Month; Mangifera; Passiflora; ...**7.0006**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ... **8.0024**

ROOT STUDIES ON COCOA, CASHEW AND KOLA ... Cola; Management; Soil Environment -other; ...**9.0125**

SELECTION AND BREEDING OF CASHEW FOR HIGH YIELD AND DESIRABLE NUT CHARACTERISTICS ... Breeding & Genetics; Top Cross; ...**9.0150**

MINERAL NUTRITION OF CASHEW ... Deficiencies; Fertilizer Toxicity; Management; ...**9.0151**

INSECT PESTS ASSOCIATED WITH CASHEW IN NIGERIA ... Insecta -other; Nuts; Pests; Surveys; Taxonomy, Animal; Thysanoptera; ...**9.0152**

ECONOMICS OF PRODUCTION IN TREE CROP AGRICULTURE ... Capital & Financial Management; Cola; Costs; Management; Plant Industries -other; Savings and Investment; ... **9.0153**

CROP UTILIZATION PROJECT ... By-products- Plant(Vegetative); Chocolate & Cocoa; Compost; Food Processing Wastes; Nuts & Nutmeats; Preserves & Jelly; ...**9.0154**

SEED GARDEN RESEARCH PROJECT ... Cola; Intraspec. Genetic Relations; Management; Space Competition; ...**9.0155**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Environments, Plant; Luvic Arenosols; Mangifera; Passiflora; Psidium; ...**11.0143**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Dystric Nitosols; Environments, Plant; Management; Musa; Persea; ...**11.0144**

CULTIVATION OF GROUNDNUTS IN ANACARDIUM (CASHEW NUT) PLANTATION DURING THE FIRST FEW YEARS OF DEVELOPMENT OF THE TREE ... Costs; Intercropping; Management; Sesamum; ...**14.0010**

Mangifera

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Persea; Psidium; Two Humid Seasons; ...**1.0011**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Persea; Psidium; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Management; Passiflora; Plant Virus -general; Sapotaceae; ...**1.0071**

INTERCROPPING OF SHEEP UNDER PLANTATION CROPS ... Citrus; Intercropping; Management; Persea; ... **3.0059**

STUDIES ON PLANT PARASITIC NEMATODES ASSOCIATED WITH ECONOMIC CROPS IN GHANA ... Cocos; Nicotiana; Saccharum; ...**3.0127**

STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Management; Passiflora; Phytophthora; ...**4.0155**

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopodiaceae; Guttiferae; Olea; Psidium; Sapindaceae; ...**5.0020**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Eutric Fluvisols; Humid 4 Months; Passiflora; Psidium; ...**6.0004**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid 1 Month; Passiflora; ...**7.0006**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ... **8.0024**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Environments, Plant; Luvic Arenosols; Passiflora; Psidium; ...**11.0143**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Dystric Nitosols; Environments, Plant; Management; Musa; Persea; ...**11.0144**

Annonaceae

STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Management; Passiflora; Phytophthora; ...**4.0155**

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopodiaceae; Guttiferae; Olea; Psidium; Sapindaceae; ...**5.0020**

Apocynaeae

STUDY OF GROWTH AND OF RHYTHMIC DEVELOPMENT IN JOINTED PLANTS AND FLUSH PLANTS ... Biological Rhythms; Environments, Plant; Growth and Differentiation; Phenology, Life Cycle; Plant Morphology; ...**4.0048**

Bombacaceae

Ceiba

THE NATURAL RESISTANCE OF GHANAIAN TIMBERS TO TERMITE ATTACK ... Forestry Insects; Isoptera; Leguminosae -other; Olacaceae; ...**3.0233**

Boraginaceae

FOREST TREES ESTABLISHMENT TRIALS ... Eucalyptus; Lime; Silviculture; ...**9.0063**

Caricaceae

Carica

STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Management; Passiflora; Phytophthora; ...**4.0155**

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopodiaceae; Guttiferae; Olea; Psidium; Sapindaceae; ...**5.0020**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Humid 1 Month; Mangifera; Passiflora; ...**7.0006**

Chenopodiaceae

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Guttiferae; Olea; Psidium; Sapindaceae; ... **5.0020**

Atriplex

STUDY THE POSSIBILITIES OF AFFORESTATION ON THE SALT LANDS OF SINE-SALOUM ... Chlorine; Humid 3 Months; Prosopis; Silviculture; ...**11.0139**

INTRODUCTION OF FORAGE SHRUBS INTO AN ARID ZONE ... Cover Crops; Humid 1 Month; Luvic Arenosols; Orthic Solonetz; Vertic Cambisols; ...**14.0007**

Combretaceae

Terminalia

SELECTION OF PROVISIONAL PLUS TREES ... Cedrela; Seed Production; Tree Breeding; Triplochiton; Variation and Selection; ...**3.0082**

PROVENANCE TRIAL OF TEAK AND TERMINALIA IVORENSIS ... Nursery Observational Plots; Silviculture; Tectona; Variation and Selection; ...**3.0083**

ESTABLISHMENT OF CLONAL SEED ORCHARDS ... Cedrela; Seed Production; Silviculture; Triplochiton; Variation and Selection; ...**3.0084**

ESTABLISHMENT OF CLONE BANKS ... Cedrela; Leguminosae -other; Triplochiton; ...**3.0085**

STUDIES ON THE BIONOMICS OF POTENTIALLY DANGEROUS INSECTS ATTACKING INDIGENOUS PLANTATIONS OF ACCEPTED EXPORT TIMBER SPECIES ... Chlorophora; Forests; Population Dynamics; Pyralidae; ... **3.0093**

STUDIES ON PESTS OF FOREST TREE SEEDS IN GHANA ... Curculionidae; Digenea; Forestry Insects; Surveys; Triplochiton; ...**3.0094**

A STUDY OF THE FACTORS AFFECTING THE RESISTANCE OF TERMINALIA IVORENSIS TO TERMINATE

Compositae

Eupatorium

Lactuca

Convolvulaceae

Ipomoea

Cruciferae

Brassica Oleracea

Cucurbitaceae

Cucumis

Cucurbita

Euphorbiaceae

Manihot

Flacourtiaceae

Guttiferae

Lauraceae

Persea

Leguminosae

Acacia

Cajanus

Malvaceae

Meliaceae

INSECT PESTS ON FLOWERS, SEEDS AND SEEDLING OF FOREST TREES ... Forestry Insects; Insecta; Management; Quarantine &/or Inspection; Surveys; ...**9.0094**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ...**9.0105**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Nauclea; Triplochiton; Wood Preservation & Seasoning; ...**9.0106**

Meliaceae -other

PROTECTION OF WOOD AGAINST FIRE ... Borax; Chemical Materials; Finishes of Textiles; Sapotaceae; ...**3.0110**

PHENOLOGY AND ECOLOGY OF THE SIPO (ENTANDROPHRAGMA UTIL) - RHYTHM OF GROWTH IN NATURAL FOREST ... Climate- Humid Equatorial; Dendrochronology; Phenology, Life Cycle; Plant Morphology; ...**4.0083**

EXPERIMENTS ON SOURCES OF ORIGIN OF DIFFERENT SPECIES OF TREES FOR PLANTATION ... Eucalyptus; Pinus; Tectona; Terminalia; Tree Breeding; Variation and Selection; ...**4.0084**

TAXONOMY, BIOLOGY AND CONTROL OF BORERS OF MELIACEAE ... Forestry Insects; Insecta -other; Taxonomy, Animal; ...**9.0092**

Moraceae

Chlorophora

STUDIES ON THE BIONOMICS OF POTENTIALLY DANGEROUS INSECTS ATTACKING INDIGENOUS PLANTATIONS OF ACCEPTED EXPORT TIMBER SPECIES ... Forests; Population Dynamics; Pyralidae; Terminalia; ...**3.0093**

PROTECTION OF WOOD AGAINST FIRE ... Borax; Chemical Materials; Finishes of Textiles; Meliaceae -other; Sapotaceae; ...**3.0110**

BREEDING FOR RESISTANCE TO VARIOUS PESTS AND DISEASES ... Insect Resistance; Nauclea; Terminalia; ...**9.0076**

SOLAR AND AIR DRYING OF TIMBER ... Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ...**9.0105**

Myristicaceae

THE NATURAL RESISTANCE OF GHANAIAN TIMBERS TO TERMITE ATTACK ... Forestry Insects; Isoptera; Leguminosae -other; Olacaceae; ...**3.0233**

Myrtaceae

Eucalyptus

FIELD TEST OF TREATED ROUND POSTS FOR FENCING ... Fencing; Tectona; Wood Preservation & Seasoning; ...**3.0099**

EXPERIMENTS ON SOURCES OF ORIGIN OF DIFFERENT SPECIES OF TREES FOR PLANTATION ... Meliaceae - other; Pinus; Tectona; Terminalia; Tree Breeding; Variation and Selection; ...**4.0084**

COMPARATIVE PLANTATION OF DIFFERENT SPECIES OF EUCALYPTUS OF DIFFERENT ORIGINS ... Humid 1 Month; Luvic Arenosols; Variation and Selection; ...**8.0011**

EXPERIMENT WITH EUCALYPTUS CAMALDULENSIS OF DIFFERENT ORIGINS ... Humid 1 Month; Luvic Arenosols; Variation and Selection; ...**8.0012**

EXPERIMENT ON MANUAL TILLAGE BEFORE PLANTATION ... Hand Tillage; Humid 1 Month; Luvic Arenosols; Silviculture; ...**8.0013**

EXPERIMENT ON THE SPACING OF EUCALYPTUS ... Humid 1 Month; Luvic Arenosols; Silviculture; Space Competition; ...**8.0014**

STUDY OF EUCALYPTUS - SOIL RELATIONSHIP ... Humid 1 Month; Luvic Arenosols; Silviculture; ...**8.0015**

INTRODUCTION OF EUCALYPTUS ... Humid 1 Month; Luvic Arenosols; Variation and Selection; ...**8.0017**

GROWING EUCALYPTUS FROM CUTTINGS ... Humid 1 Month; Light Quantity or Intensity; Luvic Arenosols; Mist Irrigation; Silviculture; Soil Environment -other; ...**8.0019**

FOREST TREES ESTABLISHMENT TRIALS ... Boraginaceae; Lime; Silviculture; ...**9.0063**

GROWTH PATTERNS OF IMPORTANT TIMBER TREE SPECIES ... Cedrela; Gmelina; Measurement of Trees & Stands; Osmotic and Turgor Pressure; Rain; Soil Moisture; Tectona; ...**9.0079**

HYBRIDIZATION IN EUCALYPTUS ... F Generation (F1, F2, F3, Etc); Humid 4 Months; Pricking Out; Silviculture; Tree Breeding; ...**9.0341**

FOREST TREES PROVENANCE TRIALS ... Humid 4 Months; Pinus; Tectona; Variation and Selection; Wood Structure & Properties; ...**9.0342**

COMPARISON OF POTTING MIXTURES FOR NURSERY STOCK ... Dowfume Cpds.; Inoculation; Mycorrhiza; Nursery Observational Plots; Sand; Soil Potting Mixture; ...**9.0345**

TYPE AND SIZE OF CONTAINERS FOR RAISING NURSERY STOCK ... Nursery Observational Plots; Packaging Materials; Physical Properties; Radiation Effects; Silviculture; ...**9.0346**

EFFECT OF REMOVAL, PARTIAL REMOVAL AND NON-REMOVAL OF POLYTHENE POTS ON PLANTATION SPECIES ... Forestry Insects; Humid 4 Months; Isoptera; Pinus; Planting Methods -other; Silviculture; ...**9.0348**

PLANTATION TRIALS ... Humid 4 Months; Pinus; Tectona; ...**9.0350**

ESTABLISHMENT OF SEED ORCHARDS ... Humid 4 Months; Pinus; Seed Nurseries; Silviculture; Variation and Selection; ...**9.0351**

CULTIVATION AND WEEDING METHODS IN PLANTATIONS ... Costs; Hand Tillage; Mechanical Control; Pinus; ...**9.0356**

WATER STRESS IN RELATION TO GROWTH AND SURVIVAL IN SEEDLINGS OF EUCALYPTUS AND SOME INDIGENOUS SAVANNA SPECIES ... Humid 4 Months; Moisture Budgets; Moisture Deficiency; Passm; Plant Requirements -water; Silviculture; ...**9.0359**

STUDY OF THE POSSIBILITIES OF REPLANTING WOODLAND IN THE WESTERN CENTRE OF SENEGAL UTILIZING EXOTIC SPECIES OF RAPID GROWTH ... Chromic Vertisols; Fuel -wood; Planting Methods -other; Shelter Belts, Windbreaks; Soil Depth; ...**11.0118**

STUDY THE POSSIBILITIES OF AFFORESTATION ON THE SALT LANDS OF SINE-SALOUM ... Chlorine; Humid 3 Months; Prosopis; Silviculture; ...**11.0139**

STUDY THE POSSIBILITIES OF REPLANTING WOODLAND IN THE DELTA OF THE SENEGAL RIVER ... Costs; Luvic Arenosols; Prosopis; Soil Types; ...**11.0140**

SILVICULTURAL RESEARCH WORK IN AN ARID ZONE - EXPERIMENT ON THE INTRODUCTION OF EXOTIC SPECIES ... Fuel -wood; Humid 1 Month; Luvic Arenosols; Moisture Deficiency; Silviculture; Wind Erosion; ...**11.0142**

EXPERIMENTS WITH FERTILIZERS IN PLANTATIONS OF EUCALYPTUS CAMALDULENSIS ... Phosphates; Potassium; Silviculture; Sulfates; Sulfur; ...**13.0019**

TRIALS OF EUCALYPTUS OF DIFFERENT ORIGINS ... Gleyic Luvisols; Lithosols; Silviculture; ...**14.0006**

EXPERIMENT FOR (SELECTION BY) ELIMINATION OF SPECIES OF EUCALYPTUS ... Dystric Nitosols; Ferric Luvisols; Gleyic Luvisols; Humid 4 Months; Variation and Selection; ...**14.0039**

Psidium

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Two Humid Seasons; ...**1.0011**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Management; Passiflora; Plant Virus -general; Sapotaceae; ...**1.0071**

STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Management; Passiflora; Phytophthora; ...**4.0155**

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopódiaceae; Guttiferae; Olea; Sapindaceae; ...**5.0020**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Eutric Fluvisols; Humid 4 Months; Mangifera; Passiflora; ...**6.0004**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ...**8.0024**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Environments, Plant; Luvic Arenosols; Mangifera; Passiflora; ...**11.0143**

SURVEY OF WOOD DENSITY VARIATION OF SOME NIGERIAN TREE CROPS ... Gmelina; Moisture Content -plants; Tectona; Tree Breeding; Wood Structure & Properties; ...**9.0102**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Khaya; Triplochiton; Wood Preservation & Seasoning; ...**9.0106**

Rutaceae

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopodiaceae; Guttiferae; Olea; Psidium; Sapindaceae; ...**5.0020**

Citrus

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0011**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Management; Passiflora; Plant Virus -general; Sapotaceae; ...**1.0071**

CITRUS ROOTSTOCK TRIAL ... Entomology, Applied; Fungal Resistance; Gummosis; Management; Orange Tree Quick Decline; Virus Resistance; ...**2.0008**

ROOTSTOCKS FOR LATE VALENCIA ORANGE ... Disease Resistance; Fruits and Berries; Sugar -nonspecific; ...**3.0052**

INTERCROPPING OF SHEEP UNDER PLANTATION CROPS ... Intercropping; Management; Mangifera; Persea; ... **3.0059**

STUDIES ON PLANT PARASITIC NEMATODES ASSOCIATED WITH ECONOMIC CROPS IN GHANA ... Cocos; Mangifera; Nicotiana; Saccharum; ...**3.0127**

INTRODUCTION OF EXOTIC PLANTS ... Cocos; Disease Resistance; Insect Resistance; Phenology, Life Cycle; Plant Parts Bank; Triticum; ...**3.0208**

STUDY OF THE ADAPTATION OF CITRUS FRUIT TREES IN THE DIFFERENT CLIMATIC ZONES OF THE IVORY COAST ... Breeding & Genetics; Climate- Continental Sav.-Trop.; Fats & Oils; Fruits and Berries; Quality and Utilization; ... **4.0156**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Eutric Fluvisols; Humid 4 Months; Mangifera; Passiflora; Psidium; ...**6.0004**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid I Month; Mangifera; Passiflora; ...**7.0006**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ... **8.0024**

PESTS OF CITRUS ... Coccidae; Ecology, Animal; Fruits and Berries; Noctuidae; ...**9.0259**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Environments, Plant; Luvic Arenosols; Mangifera; Passiflora; Psidium; ...**11.0143**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Dystric Nitosols; Environments, Plant; Management; Musa; Persea; ...**11.0144**

Sapindaceae

GERMINATION AND GROWTH OF VARIOUS TROPICAL FRUIT SEEDS ... Chenopodiaceae; Guttiferae; Olea; Psidium; ...**5.0020**

Sapotaceae

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0011**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Dystric Nitosols; Management; Passiflora; Plant Virus -general; ...**1.0071**

PROTECTION OF WOOD AGAINST FIRE ... Borax; Chemical Materials; Finishes of Textiles; Meliaceae -other; ...**3.0110**

STUDY OF THE POSSIBILITIES OF FRUIT CROPS IN THE LOWER IVORY COAST ... Climate- Humid Equatorial; Management; Passiflora; Phytophthora; ...**4.0155**

Scrophulariaceae

SORGHUM CROP PROTECTION ... Cereal Crops; Rearing of Insects; Seedling Diseases -nonspecific; Smuts; Tettigonidae; ... **9.0159**

Solanaceae

Capsicum

IDENTIFICATION OF VIRUSES OF MARKET GARDENING PLANTS IN THE IVORY COAST - GOMBO (OKRA), PASSION-FRUIT AND PEPPER ... Mosaic Viruses; Passiflora; Phytopathology; Plant Virus -general; Vectors; Viral Transmission; ...**4.0077**

PEPPER IMPROVEMENT ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Ferric Luvisols; Synthetic Varieties & Blends; ...**9.0163**

INCORPORATION OF LEAFLY AND FRUIT VEGETABLE AND PEPPER PRODUCTION INTO FARMING SYSTEMS ... Continuous Humid 7 Months,Plus; Ferralic Cambisols; Ferric Luvisols; Lycopersicum; Management; Plant Industries -other; ...**9.0165**

PESTS OF OKRA, TOMATOES AND PEPPERS ... Insecticides -nonspecific; Lycopersicum; Surveys; Vegetables; ...**9.0261**

NEMATODES OF VEGETABLES ... DD; Lycopersicum; Nemagon; Nematode Resistance; Phytopathology; Tylenchoidea; ...**9.0265**

Lycopersicum

VEGETABLE VARIETY TRIALS FOR CANNING OR BLAST FREEZING ... Crop Rotation, Cropping System; Freezing; Phaseolus; Vegetable & Vegetable Products; ...**2.0006**

COMPOSTING OF SAWDUST ... C/N Ratio; Compost; Management; Organic Soils; Sawdust Utilization; ...**3.0100**

INVESTIGATION INTO THE BIOLOGY AND CONTROL OF ROOT-KNOT NEMATODES ON SOME CROPS ... Continuous Humid 7 Months,Plus; Culturing Techniques; DD; Nemagon; Nicotiana; Population Dynamics; ...**3.0128**

EVALUATION OF CERTAIN FUNGICIDES FOR THE CONTROL OF SCLEROTIUM WILT DISEASE CAUSED BY SCLEROTIUM ROLFSII ON VEGETABLES AND LEGUMES ... Continuous Humid 7 Months,Plus; Sclerotium; Selectivity of Pesticides; Wilts; ...**3.0131**

VEGETABLE PESTS AND EVALUATION OF INSECTICIDES FOR THEIR CONTROL ... Continuous Humid 7 Months,Plus; Pulse Crops; Solanum; Surveys; ...**3.0133**

TOMATO VARIETY TRIAL ... Continuous Humid 7 Months,-Plus; Management; Rain; Timing of Planting Procedures; ... **3.0149**

TOMATO BREEDING ... Breeding & Genetics; Cobalt; Continuous Humid 7 Months,Plus; Disease Resistance; Mutation; ... **3.0150**

TOMATO - COWPEA ROTATION ... Continuous Humid 7 Months,Plus; Crop Rotation, Cropping System; Management; Plant Nematodes -nonspecific; ...**3.0151**

STUDY OF THE PARASITIC FUNGI OF MARSHLAND CROPS - ANNUAL AND GEOGRAPHICAL VARIATION OF THE MYCOFLORA ... Fungal Resistance; Hyphomycetes; Marsh; Surveys; ...**4.0066**

ADAPTION TRIAL ON VEGETABLE CROPS ... Brassica Oleracea; Cucurbita; Lactuca; Management; Sprinkler Irrigation; ...**7.0005**

LEAFLY AND FRUIT VEGETABLE IMPROVEMENT ... Breeding & Genetics; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Ferric Luvisols; Synthetic Varieties & Blends; ...**9.0164**

INCORPORATION OF LEAFLY AND FRUIT VEGETABLE AND PEPPER PRODUCTION INTO FARMING SYSTEMS ... Capsicum; Continuous Humid 7 Months,Plus; Ferralic Cambisols; Ferric Luvisols; Management; Plant Industries -other; ... **9.0165**

PESTS OF OKRA, TOMATOES AND PEPPERS ... Capsicum; Insecticides -nonspecific; Surveys; Vegetables; ...**9.0261**

NEMATODES OF VEGETABLES ... Capsicum; DD; Nemagon; Nematode Resistance; Phytopathology; Tylenchoidea; ...**9.0265**

STUDY OF VARIETIES OF TOMATO RESISTANT TO NEMATODES ... Nematode Resistance; Phytopathology; Soil Environment; Surveys; Tylenchoidea; ...**11.0046**

UTILIZATION OF OLEAGINOUS ANNUALS ON IRRIGATED PERIMETERS ... Glycine Max; Irrigation -general; Management; Multiple Cropping; Sesamum; ...**14.0011**

Sterculiaceae

STUDIES ON PESTS OF FOREST TREE SEEDS IN GHANA ... Curculionidae; Digenea; Forestry Insects; Surveys; Terminalia; ...**3.0094**

TERMITE ECOLOGY AT FUMESUA, GHANA ... Factors Affecting Insect Pop.; Forests; Population Dynamics; Soil Environment; ...**3.0234**

CONSTRUCTION OF GROWTH AND YIELD TABLES FOR EVEN-AGED TREE CROPS ... Gmelina; Nauclea; Site Index and Site Quality; Terminalia; ...**9.0069**

SELECTION AND TESTING OF OUTSTANDING TREES OF IMPORTANT PLANTATION SPECIES ... Gmelina; Nauclea; Plant Parts Bank; Tectona; Variation and Selection; ... **9.0074**

FOREST TREES SEED DORMANCY, STORAGE AND GERMINATION ... Germination; Management; Tectona; Terminalia; ...**9.0078**

GROWTH PATTERNS OF IMPORTANT TIMBER TREE SPECIES ... Cedrela; Gmelina; Measurement of Trees & Stands; Osmotic and Turgor Pressure; Rain; Soil Moisture; Tectona; ... **9.0079**

STUDY OF BIOLOGY AND CONTROL OF BORERS ... Forestry Insects; Lepidoptera -other; Nauclea; Population Dynamics; Surveys; Terminalia; ...**9.0093**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Physical Properties; Terminalia; Wood Preservation & Seasoning; Xylem; ...**9.0096**

SURVEY OF WOOD DENSITY VARIATION OF SOME NIGERIAN TREE CROPS ... Gmelina; Moisture Content -plants; Tectona; Tree Breeding; Wood Structure & Properties; ...**9.0102**

CELLULOSE CONTENT OF NIGERIAN TIMBERS ... Cellulose; Gmelina; Terminalia; Wood Structure & Properties; Xylem; ...**9.0103**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ... **9.0105**

SURVEY OF THE MOISTURE CONTENT OF WOOD IN SERVICE IN NIGERIA ... Composition; Khaya; Nauclea; Wood Preservation & Seasoning; ...**9.0106**

Tiliaceae

Corchorus

EXPERIMENTS WITH VARIETIES OF HIBISCUS, CORCHORUS AND URENA ... Environments, Plant; Humid 6 M.or Less; Management; Two Humid Seasons; ...**1.0053**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS CAPSULARIS ... Fibers; Humid 7 Months; Management; Timing of Planting Procedures; ...**3.0073**

INVESTIGATION INTO THE BIOLOGY AND CONTROL OF ROOT-KNOT NEMATODES ON SOME CROPS ... Continuous Humid 7 Months,Plus; Culturing Techniques; DD; Nemagon; Nicotiana; Population Dynamics; ...**3.0128**

INVESTIGATION INTO THE INSECT PESTS OF BAST FIBRES AND THEIR CONTROL ... Continuous Humid 7 Months,Plus; Fiber Crops; Insecticides -nonspecific; Surveys; Urena; ...**3.0134**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS, CAPSULARIS ... Continuous Humid 7 Months,Plus; Fibers; Management; Timing of Planting Procedures; ...**3.0178**

EFFECTS OF DIFFERENT DATES OF PLANTING OF THE GROWTH AND FIBRE YIELD OF JUTE, CORCHORUS, CAPSULARIS ... Dry Monsoon 5 Months, Plus; Fibers; Management; Timing of Planting Procedures; ...**3.0199**

EFFECTS OF DIFFERENT DATES OF PLANTING ON THE GROWTH AND FIBRE YIELD OF JUTE, CARCHORUS, CAPSULARIS ... Eutric Nitosols; Fibers; Management; Moist Monsoon 0 to 3 Months; Timing of Planting Procedures; ... **3.0207**

NEMATOLOGICAL STUDIES ON COTTON PLANTS AND DIFFERENT FIBRE PLANTS IN DAHOMEY ... Parakou Virus; Phytopathology; Surveys; Tylenchoidea; Vectors; ... **4.0072**

SELECTION OF SPECIES OF HESSIAN FIBRES OTHER THAN DAH (HIBISCUS CANNABINUS) ... Breeding & Genetics; Urena; ...**6.0085**

Ulmaceae

Celtes

STUDY OF THE POSSIBILITIES OF REPLANTING OF WOODLAND IN THE WESTERN CENTRE OF SENEGAL UTILIZING LOCAL FOREST SPECIES ... Chromic Vertisols; Fuel -wood; Humid 3 Months; Planting Methods; Silviculture; ...**11.0119**

Holoptelea

NIGERIAN TIMBERS FOR SPORTS GOODS ... Forest Product Development; Outdoor Recreation; Ulmaceae -other; Wood; Wood Structure & Properties; ...**9.0101**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Ulmaceae -other; Wood Preservation & Seasoning; ... **9.0105**

Ulmaceae -other

THERMAL DECOMPOSITION OF WOOD CHARCOAL ... Charcoal; Forest Product Development; Industrial Operation; Scrub Timber Utilization; Thermal Decomposition; Wood Chemistry; ...**3.0108**

NIGERIAN TIMBERS FOR SPORTS GOODS ... Forest Product Development; Holoptelea; Outdoor Recreation; Wood; Wood Structure & Properties; ...**9.0101**

SOLAR AND AIR DRYING OF TIMBER ... Chlorophora; Costs; Energy Conversion; Instrumentation, Equipment; Solar Processes; Wood Preservation & Seasoning; ...**9.0105**

Umbelliforae

Daucus

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Verbenaceae

Gmelina

FIELD TEST OF TREATED ROUND POSTS FOR FENCING ... Eucalyptus; Fencing; Tectona; Wood Preservation & Seasoning; ...**3.0099**

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SILVICULTURE - THINNING AND SPACING TRIALS ... Nauclea; Silviculture; Space Competition; Tectona; Terminalia; ...**9.0064**

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CONSTRUCTION OF GROWTH AND YIELD TABLES FOR EVEN-AGED TREE CROPS ... Nauclea; Site Index and Site Quality; Terminalia; ...**9.0069**

IMPROVEMENT OF POTTING MIXTURE IN FOREST NURSERIES ... Movement, Availability; Silviculture; Synthetic Soils; Terminalia; ...**9.0070**

EFFECT OF FOREST PLANTATION ON SOIL PHYSICAL AND CHEMICAL PROPERTIES ... Elevational Levels, Altitude; Pinus; Silviculture; Soil Analysis; Soil Environment -other; Soil Physical Properties; ...**9.0072**

SELECTION AND TESTING OF OUTSTANDING TREES OF IMPORTANT PLANTATION SPECIES ... Nauclea; Plant Parts Bank; Tectona; Variation and Selection; ...**9.0074**

DEVELOPMENT OF SEED STANDS AND SEED ORCHARDS ... Intraspec. Genetic Relations; Management; Silviculture; Tectona; Variation and Selection; ...**9.0075**

GROWTH PATTERNS OF IMPORTANT TIMBER TREE SPECIES ... Cedrela; Measurement of Trees & Stands; Osmotic and Turgor Pressure; Rain; Soil Moisture; Tectona; ...**9.0079**

CONTROL OF ROOT ROT OF SUSCEPTIBLE PLANTATION TREE SPECIES ... Cucumis; Management; Plant Pathogenetic Fungi; Root Rot; Space Competition; Terminalia; ...**9.0086**

STUDY OF PROPERTIES AND CHARACTERISTICS OF PLANTATION GROWN TIMBERS ... Construction Materials; Joining & Bolting; Physical Properties; Terminalia; Wood Preservation & Seasoning; Xylem; ...**9.0096**

SURVEY OF WOOD DENSITY VARIATION OF SOME NIGERIAN TREE CROPS ... Moisture Content -plants; Tectona; Tree Breeding; Wood Structure & Properties; ...**9.0102**

Plants - Gymnosperms

Cycadales

Pinus

Plants - Monocots

Bromeliaceae

TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES ... Erosion Control; Management; Removal of Nutrients from Soil; Two Humid Seasons; ...**4.0148**

PINEAPPLES - PHYTOSANITARY PROTECTION ... Fruits and Berries; Horticultural Crops; Phytopathology; Two Humid Seasons; ...**4.0149**

PINEAPPLES. IMPROVEMENT OF THE PLANT - INTERACTION BETWEEN PLANT AND ENVIRONMENT ... Breeding & Genetics; Management; Two Humid Seasons; Xanthix Ferralsols; ...**4.0150**

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ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid 1 Month; Mangifera; Passiflora; ...**7.0006**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ...**8.0024**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Environments, Plant; Luvic Arenosols; Mangifera; Passiflora; Psidium; ...**11.0143**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Dystric Nitosols; Environments, Plant; Management; Musa; Persea; ...**11.0144**

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Cyperus Rotundus

HERBICIDE EXPERIMENTS WITH COTTON ON ALLUVIALLY DISTRIBUTED SOILS ... Grass -nonspecific; Herbicides -nonspecific; ...**8.0048**

Scirpus

AGRONOMIC STUDIES ON IRRIGATED, RAINFED LOWLAND AND UPLAND RICE ... Bentazon; D, 2,4-; Drought Resistance; Grass -nonspecific; Irrigation -general; Pesticides - other; Rain; ...**10.0001**

Gramineae

Andropogon

GRASS AND LEGUME SEED - IMPROVEMENT AND MULTIPLICATION ... Centrosema; Foundation Seed; Panicum; Setaria; ...**3.0022**

PRODUCTIVITY OF GRASS/LEGUME PASTURES AGAINST PURE STANDS OF GRASSES AND LEGUMES ... Centrosema; Digitaria; Forage Grasses; Forage, Pasture or Range; In Vitro Feed Studies; Legume-grass Mixtures; ...**3.0025**

THE FEEDING OF WHEAT BRAN TO CATTLE (SOME OBSERVATIONS ON FATTENING MATURE CATTLE ON WHEAT BRAN AND BAGASSE) ... Bran; Digitaria; In Vivo--see Also Feed Rations; Wheat; ...**3.0039**

EXPERIMENTS WITH FORAGE PLANTS IN IRRIGATED CULTIVATION ... Continuous Humid; Irrigation; Management; Pueraria; Tripsacum; ...**4.0024**

MEDIUM TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY RESTORATIVE POWERS OF MEDIUM DURATION FALLOWING ... Centrosema; Cynodon; Ferric Acrisols; Legume-grass Mixtures; Organic Fertility; Pueraria; ...**9.0250**

Andropogoneae -other

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Brachiaria

EXPERIMENTS WITH FORAGE PLANTS IN IRRIGATED CULTIVATION ... Continuous Humid; Irrigation; Management; Pueraria; Tripsacum; ...**4.0024**

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Chlorideae -other

FORAGE CROP EXPERIMENTATION ... Hot Equatorial or Hot Tropical; Management; Mucuna; Panicum; Sorghum Vulgare (Forage); ...**11.0002**

Cynodon

NUTRITIVE VALUE OF DIGITARIA DECUMBENS AND CYNODON PLECTOSTACHYUS IN ADMIXTURE WITH CENTROSEMA PUBESCENS ... Centrosema; Digitaria; Forage Legumes; In Vitro Feed Studies; ...**3.0023**

THE FEEDING OF WHEAT BRAN TO CATTLE (SOME OBSERVATIONS ON FATTENING MATURE CATTLE ON WHEAT BRAN AND BAGASSE) ... Bran; Digitaria; In Vivo--see Also Feed Rations; Wheat; ...**3.0039**

SOIL CONSERVING CROPS ... Cajanus; Continuous Humid 7 Months,Plus; Disease Resistance; Ferralic Cambisols; Forage Grasses, Pasture, Range; Insect Resistance; Paniceae -other; Pueraria; ...**9.0185**

THE EFFECT OF GRASS - LEGUME MIXTURES ON HERBAGE PRODUCTION AND CHEMICAL COMPOSITION AS COMPARED WITH APPLICATION OF NITROGEN PERT ... In Vitro Feed Studies; Management; Proteins; ...**9.0208**

MEDIUM TERM SOIL FERTILITY TRIAL - SOIL PRODUCTIVITY RESTORATIVE POWERS OF MEDIUM DURATION FALLOWING ... Centrosema; Ferric Acrisols; Legume-grass Mixtures; Organic Fertility; Pueraria; ...**9.0250**

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Digitaria

GRASS AND LEGUME SEED - IMPROVEMENT AND MULTIPLICATION ... Centrosema; Foundation Seed; Panicum; Setaria; ...**3.0022**

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PRODUCTIVITY OF GRASS/LEGUME PASTURES AGAINST PURE STANDS OF GRASSES AND LEGUMES ... Centrosema; Forage Grasses; Forage, Pasture or Range; In Vitro Feed Studies; Legume-grass Mixtures; ...**3.0025**

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STUDY OF SETTING UP ARTIFICIAL PASTURES ON MARSHY GROUND ... Brachiaria; Depth- Water Level Fluctuation; Excessive Moisture; Marsh; Panicum; Stylosanthea; ...**4.0026**

FODDER CROP IMPROVEMENT ... Forage, Pasture or Range; Management; Paspalum; ...**6.0045**

Echinochloa

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THE PRODUCTIVITY OF IRRIGATED PASTURES ... Dry Monsoon 4 to 5 Months; Irrigation; Irrigation -general; Management; ...**3.0016**

DRY MATTER YIELD ASSESSMENT OF LOCAL AND EXOTIC GRASS SPECIES ... Forage Grasses; Forage, Pasture or Range; In Vitro Feed Studies; ...**3.0026**

STUDY OF THE GERMINATIVE CAPACITY OF WEED SEEDS ... Continuous Humid; Germination; Grasses or Sedges; Physiology of Weeds; ...**4.0157**

HERBICIDE EXPERIMENTS WITH COTTON ON ALLUVIALLY DISTRIBUTED SOILS ... Cyperus Rotundus; Herbicides -nonspecific; ...**8.0048**

PRE-PLANTING HERBICIDE TRIAL ON RICE ... Dalapon; Humid 6 Months; Planavin; ...**9.0004**

THE SOIL-PLANT SYSTEM IN RELATION TO THE INORGANIC NUTRITION OF HERBAGE GRASSES IN NI-

Sorghum Vulgare (Syrup)

Tripsaceae -other

Tripsacum

STUDY OF DENSITY AND PLANTATION ARRANGEMENT FOR COCONUT PALM ... Management; Placement; Space Competition; ...**4.0326**

STUDY THE RESISTANCE OF THE COCONUT PALM TO HELMINTHOSPORIOSIS ... Breeding & Genetics; Fungal Resistance; Inoculation; Phytopathology; Selfing; ...**4.0328**

THE INSECT PESTS OF THE COCONUT PALM IN NIGERIA ... Coleoptera; Hemiptera; Lepidoptera; Oilseed Crops; Pests; Surveys; ...**9.0309**

GENE POOL (COCONUT, RAPHIA, DATE PALMS) ... Breeding & Genetics; Management; Palmae -other; Phoenix; Plant Parts Bank; Taxonomy, Plant; ...**9.0316**

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SHORT-STEMMED OIL PALM ... Breeding & Genetics; Intergeneric Cross; Phenotypes; ...**9.0291**

GENE POOL (COCONUT, RAPHIA, DATE PALMS) ... Breeding & Genetics; Cocos; Management; Phoenix; Plant Parts Bank; Taxonomy, Plant; ...**9.0316**

THE MARKET FOR PALM WINE IN NIGERIA ... Consumer Pref. & Consumption; Food Distribution Research; Marketing; Wine; ...**9.0333**

Phoenix

THE PRESERVATION OF PALM FRUIT AS DEFIBRED MESOCARP PASTE ... Fruits; Heating; Shelf Life & Storage of Food; ...**3.0213**

PROJECT ON ADAPTED CONTROL MEASURES AGAINST THE INSECT AND ACARID PESTS OF FRUIT CROPS ... Cambic Arenosols; Diaspididae; Insecticides -nonspecific; Population Dynamics; Rearing of Insects; Win. Tp Monsoon Desert; ...**7.0001**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHARO-SAHLIAN) ... Carica; Humid 1 Month; Mangifera; Passiflora; ...**7.0006**

DATE-PALM SELECTION. PHYTOTECHNICAL AND ECOLOGICAL RESEARCH WORK ... Calcaric Fluvisols; Groundwater; Humid 1 Month; Management; Moisture Deficiency; Streams; ...**7.0007**

ECOLOGICAL STUDY OF THE ORCHARD - SUB-ARID ZONE (SAHELO-SOUDANIAN) ... Eutric Cambisols; Management; Passiflora; Plant Virus -general; Soil Moisture; ...**8.0024**

GENE POOL (COCONUT, RAPHIA, DATE PALMS) ... Breeding & Genetics; Cocos; Management; Palmae -other; Plant Parts Bank; Taxonomy, Plant; ...**9.0316**

Platyhelminthes

Cestoda

Taenia

HELMINTH PARASITES OF PIGS IN GHANA ... Management; Population Dynamics; ...**3.0029**

Trematoda

HELMINTHOSES OF FARM ANIMALS - TREATMENTS ... Bovine Ocular Thelaziosis; Treatment; Veterinary Medicine; Visual Organs; ...**11.0089**

Digenea

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Plinthic Acrisols

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Acrisols

Plinthic Luvisols

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Luvisols

Plowing

See Soil Tillage

Pneumonia

See Animal Pathology

Pod Rot

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Rots

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Pollens

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Population Dynamics

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STUDY THE MINERAL NUTRITION OF OIL PALM ACCORDING TO THE PLANT MATERIAL ... Calcium; Deficiencies; Management; Phosphorus; Sulfur; ...**4.0299**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON GROWTH ... Calcium; Growth Stage of Plant; Magnesium; Management; Nitrogen; Phosphorus; ...**5.0004**

FERTILIZATION OF HEVEA BRASILIENSIS AND ITS EFFECT ON YIELD ... Calcium; Magnesium; Management; Nitrogen; Phosphorus; ...**5.0005**

MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM) ... Calcium; Magnesium; Nitrogen; Sorghum Vulgare (Grain); ...**11.0059**

EXPERIMENTS WITH FERTILIZERS IN PLANTATIONS OF EUCALYPTUS CAMALDULENSIS ... Eucalyptus; Phosphates; Silviculture; Sulfates; Sulfur; ...**13.0019**

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Antigen

Casein

Gliadin

Globulins

Glutelin

Heat-stable Protein

Hemagglutinins

Protozoa

Coccidia

Trypanosoma

Pseudococcidae

See Insecta
Homoptera

Pseudomonas -nonspecific

See Bacteria

Pseudomyxoviruses

See Viruses, Animal
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Psidium

See Plants - Dicots
Myrtaceae

Psyllidae

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Homoptera

Public Health

Epidemiology of Disease

Publications

Art Work, Illustrations, Etc.

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Pulse Crops

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Pyralidae

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Lepidoptera

Pyraustidae

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Lepidoptera

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Quarantine &/or Inspection

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Railroads

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IMPROVEMENT OF THE PRODUCTION OF BEEF - STUDY OF THE SEXUAL CYCLE OF SENEGAL FULANI (GOBRA) ZEBU CATTLE ... Breeding & Genetics; Pregnancy; Sexual Cycle; Vertebrate Nutrition; ... **11.0077**

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IMPROVEMENT OF THE PRODUCTION OF BEEF - STUDY OF THE SEXUAL CYCLE OF SENEGAL FULANI (GOBRA) ZEBU CATTLE ... Breeding & Genetics; Pregnancy; Semen Composition; Vertebrate Nutrition; ... **11.0077**

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Seed Production

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SEEDLING SELECTION EXPERIMENT 33-13 (PLANTED 1966) ... Growth and Differentiation; Oilseed Crops; ...**9.0299**

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A RESIDUAL SOCIAL GROUP CHALLENGED WITH THE DEVELOPMENT OF MARKET CROPS - ALLOCHTHONOUS IMMIGRATION AND LAND PROBLEMS ... Economics Anthropology; Ethnic and Social Parameters; ...**4.0082**

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STUDY OF THE TOXICITIES OF THE SOILS USED FOR CONTINUOUS AQUATIC CULTIVATION OF RICE ... Eutric Gleysols; Flood Irrigation; Management; ...**14.0060**

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TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES ... Bromeliaceae; Erosion Control; Management; Removal of Nutrients from Soil; Two Humid Seasons; ... **4.0148**

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SOIL IMPROVEMENT FOR REFORESTATION IN HIGH FOREST ZONE ... Elevational Levels, Altitude; Percolation; Soil and Rock Leaching; Soil Moisture; Soil Types; ... **9.0071**

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EVOLUTION OF NITROGEN IN CULTIVATED SOILS ... C/N Ratio; Ferralic Cambisols; Nitrogen; Nitrogen Cycle; Plant Residues -other; Two Humid Seasons-7 Month,Plus; ... **4.0215**

BALANCE THE SUPPLIES OF MANURE ON CLAY SOILS ... Clay; Fertilizer Losses; Soil and Rock Leaching; Soil Analysis; Soil Column, Leaching Diff.; ... **4.0295**

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NITROGEN FERTILIZATION IN FLOODED FIELDS - METHODS AND TIMING OF NITROGEN APPLICATION ... Broadcast Application; Eutric Gleysols; Humid 6 Months; Sodium; Timing of Application -other; ... **9.0011**

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POTASSIUM IN THE SOILS OF THE NIGERIAN OIL PALM BELT ... Clay; Management; Movement, Availability; Sand; ... **9.0292**

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STUDY OF THE ACIDIFICATION OF CULTIVATED SOILS IN SENEGAL AND DETERMINATION OF THE REQUIREMENTS IN LIME ... Cambic Arenosols; Lime; Management; Soil pH; ... **11.0065**

ADSORPTIVE AND RETENTIVE PROPERTIES AND NATURE OF SOILS OF SIERRA LEONE ... National Network -general; Soil Physical Properties; Soil Porosity; ... **12.0004**

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ROLE OF ORGANIC MATTER IN RELATION TO MINERAL FERTILIZATION IN THE PRODUCTION OF CROPS - MAIZE-COTTON ... Management; Manure; Soil Analysis; ... **4.0270**

OIL PALM - STUDY OF MINERAL BALANCES ... Greenhouses; Management; Pesticides; ... **4.0296**

STUDY OF THE NITROGENOUS FERTILIZATION OF CEREALS ... C/N Ratio; Humid 3 Months; Management; Sand; ... **8.0039**

CHANGES IN THE MINERAL CONTENT OF SOIL AND FEED AS RELATED TO THE BLOCK COMPOSITION OF FARM ANIMALS ... Blood and Lymph System; In Vitro Feed Studies; Metabolism; Soil Environment; ... **9.0028**

DISTRIBUTION PATTERNS OF YOUNG ECONOMIC TREE SPECIES AND THEIR CORRELATION WITH ENVIRONMENTAL FACTORS ... Competition; Silviculture; Soil Depth; Surveys; ... **9.0082**

SOIL CHEMISTRY ... Fallowing; Iodine; Silicon; Soil Resistance; ... **9.0178**

INVESTIGATION INTO THE CAUSES OF YAM-TUBER ROTS ... Harvest and Storage; Nutrition in Disease; Phytopathology; Storage Rot; Taxonomy, Plant; Tuber Rot; ... **9.0247**

STUDIES ON THE ROLE OF SOIL MICROBES IN SOIL FERTILITY AND RICE CULTURE ... BHC; Management; Nitrogen Fixation; Organic Fertility; Soil Microbiology; ... **10.0006**

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OPERATION OF RESEARCH IN GEODYNAMICS, GEOCHEMISTRY AND GEOMORPHOLOGY IN THE IVORY COAST ... Geology; Infiltration; Soil Morphology, Profiles; ... **4.0036**

EVOLUTION OF FERRALYTIC LANDSCAPES IN AN EQUATORIAL AND TROPICAL CLIMATE - ALTERATION, EROSION, RECASTING, HARDENING ... Climate-Humid Equatorial; Geology; Soil Analysis; Tertiary Period; ... **4.0038**

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SOIL GENESIS STUDY OF UPLAND DRIFT SOILS AND ASSOCIATED RESIDUAL SOIL ... Clay; Silt; Soil Chemical Properties; Soil Types; ... **3.0221**

OPERATION OF RESEARCH IN GEODYNAMICS, GEOCHEMISTRY AND GEOMORPHOLOGY IN THE IVORY COAST ... Geology; Infiltration; Soil Crusts; Soil Morphology, Profiles; ... **4.0036**

TYPOLOGY AND CLASSIFICATION OF FERRALYTIC SOILS IN AN EQUATORIAL TO TROPICAL CLIMATE ... Climate- Continental Sav.Trop.; Climate- Humid Equatorial; Soil Morphology, Profiles; Soil Types; ... **4.0037**

EVOLUTION OF FERRALYTIC LANDSCAPES IN AN EQUATORIAL AND TROPICAL CLIMATE - ALTERATION, EROSION, RECASTING, HARDENING ... Climate-Humid Equatorial; Geology; Soil Analysis; Soil Crusts; Tertiary Period; ... **4.0038**

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PHYSICAL EVOLUTION OF THE SOIL UNDER CULTIVATION ... Core Samples; Glycine Max; Soil Permeability; Sorghum Vulgare (Grain); ... **11.0028**

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MORPHOGENESIS OF FUNGI WITH RHIZOMORPHS AND WITH SCLEROTIA ... Cellular Physiology; Corticium; Leptoporus; Pricking Out; Sclerotium; ... **4.0065**

STUDY OF INOCULATIONS OF RHIZOBIUM ON SOYA ... Continuous Humid; Inoculation; Nitrogen Fixation; Rhizobium; ... **4.0198**

SOIL MICROBIOLOGY ... Chlorinated Hydrocarbons; Ferralic Cambisols; Herbicides -nonspecific; Nitrogen Fixation; Sulfur; Toxicity to Microorganisms; ... **9.0179**

BIOLOGICAL CONTROL OF THE BROWN LEAF SPOT DISEASE OF RICE USING ORGANISMS ANTAGONISTIC TO THE PATHOGEN ... Brown Spot; Helminthosporium; Phytopathology; Soil-borne; ... **9.0217**

TO STUDY THE MICROBIAL CONTRIBUTION TO THE NITROGEN ECONOMY OF FALLOWS ... Fallowing; Management; Nitrification; ... **9.0219**

RHIZOSPHERE MICROFLORA CONTRIBUTION TO PHOSPHATE DISSOLUTION ... Continuous Humid 7 Months,Plus; Phosphorus; Removal of Nutrients from Soil; Rhizosphere; Soil Bacteria; ... **9.0255**

STUDIES ON THE ROLE OF SOIL MICROBES IN SOIL FERTILITY AND RICE CULTURE ... BHC; Management; Nitrogen Fixation; Organic Fertility; ... **10.0006**

Soil Minerals -natural

See Environments, Plant

Soil Moisture

See Environments, Plant

See Soil Physical Properties

Soil Morphology, Profiles

DETAILED RECONNAISSANCE SOIL SURVEY OF CAPE COAST REGION, CENTRAL AND WESTERN REGION OF GHANA ... Geology; Land Use -agriculture; Roads and Highways; Soil Physical Properties; Soil Survey; Transportation; ... **3.0222**

DETAILED RECONNAISSANCE SOIL SURVEY OF THE LOWER AFRAM BASIN ... Geology; Mineralogy; Soil Physical Properties; Soil Survey; ... **3.0223**

OPERATION OF RESEARCH IN GEODYNAMICS, GEOCHEMISTRY AND GEOMORPHOLOGY IN THE IVORY COAST ... Geology; Infiltration; Soil Crusts; ... **4.0036**

TYPOLOGY AND CLASSIFICATION OF FERRALYTIC SOILS IN AN EQUATORIAL TO TROPICAL CLIMATE ... Climate- Continental Sav.Trop.; Climate- Humid Equatorial; Soil Genesis; Soil Types; ... **4.0037**

PROBLEMS CAUSED BY THE CONTACT OF FOREST WITH SAVANNAH IN THE IVORY COAST ... Balance of Nature; Silviculture; Soil Moisture; Soil-water-plant Relationships; Topographical Parameters-other; ... **4.0046**

FERTILITY STATUS OF MAJOR SOIL OF NIGERIA GROWN TO RICE ... Eutric Fluvisols; Fertilizer Technology; Management; ... **9.0012**

GENESIS OF SOME REPRESENTATIVE SOILS OF THE DESIRED SAVANNA REGION ... Geology; Soil Analysis; Soil Genesis; Soil Physical Properties; Soil Profile Studies; Soil Types; ... **9.0055**

INVESTIGATION OF THE INFLUENCE OF CLIMATE ON SOIL MORPHOLOGY AND SOIL DISTRIBUTION IN THE METAMORPHIC REGIONS OF NIGERIA ... Geology; Soil Genesis; Soil Profile Studies; Soil Types; ... **9.0056**

PHYSICAL EVOLUTION OF THE SOIL UNDER CULTIVATION ... Core Samples; Glycine Max; Soil Genesis; Soil Permeability; Sorghum Vulgare (Grain); ... **11.0028**

STUDY OF THE SOILS DEVELOPED ON THE CRYSTALLOPHYLLIAN BASE OF TOGO - CARTOGRAPHY AT 1/200,000TH OF THE SOUTHERN PART ... Geology; Sedimentology; Soil Survey; Soil Types; ... **13.0011**

CARTOGRAPHY AT 1/200,000 OF THE SOILS OF THE BASSARI DISTRICT ... Geology; Quaternary Period; Sedimentology; Soil Survey; Soil Types; Topographical Parameters-other; ... **13.0012**

Soil Nutrients/Fertilizers

Aluminum

SOIL CHEMISTRY ... Fallowing; Iodine; Mineralogy; Silicon; Soil Resistance; ... **9.0178**

CHEMICAL KINETICS OF RICE SOILS AND VARIETAL RESPONSE TO ADVERSE SOIL CONDITIONS ... Deficiencies; Management; Saline Soils; Soil pH; Soil Types; ... **10.0012**

STUDY OF THE ACIDIFICATION OF CULTIVATED SOILS IN SENEGAL AND DETERMINATION OF THE RE-

Boron

Calcium - Other Than Lime

Chlorine

Copper

Iodine

Iron

Lime

Magnesium

Manganese

Molybdenum

Silicon

Sulfur

Zinc

Soil Permeability

Soil Physical Properties

Soil Amendments

Soil Moisture

Soil Structure

Air - Water - Plant Relations

Soil Porosity

Soil Potting Mixture

Soil Preparation & Renovation

See Farm Machinery, Equip & Power

Soil Profile Studies

See Soil Analysis

Soil Resistance

See Plant Resistance

Soil Structure

See Environments, Plant

See Soil Physical Properties

Soil Survey

Soil Testing

See Soil Analysis

Soil Tillage

Animal Tillage

Chemical Tillage or Nontillage

Deep Plowing

Disking

Fallowing

Hand Tillage

Harrowing

Minimum Tillage

Plowing

Pricking Out

MORPHOGENESIS OF FUNGI WITH RHIZOMORPHS AND WITH SCLEROTIA ... Cellular Physiology; Corticium; Leptoporus; Sclerotium; Soil Microbiology; ...**4.0065**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Cereal Crops; Irrigation -general; Propanil; Silvex; ...**4.0094**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Cereal Crops; Hand Tillage; Selectivity of Pesticides; ...**4.0205**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Cereal Crops; Humid 5 Months; Selectivity of Pesticides; ...**4.0210**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Cereal Crops; Hand Tillage; Selectivity of Pesticides; Two Humid Seasons-7 Month,Plus; ...**4.0217**

CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE ... Cereal Crops; Hand Tillage; Selectivity of Pesticides; ...**4.0219**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Cereal Crops; Hand Tillage; Selectivity of Pesticides; ...**4.0221**

INFLUENCE OF THE MICROCLIMATE AND OF MINERAL FERTILIZATION ON NURSERIES OF OIL PALMS IN BAGS ... Blast; Interaction with Environment; Management; Nutritional Regulation (Host); Temperature -air; ...**4.0300**

CROPPING TECHNIQUES FOR IRRIGATED RICE ... Drill Application; Hot Equatorial or Hot Tropical; Management; Planting Methods -other; ...**8.0001**

HYBRIDIZATION IN EUCALYPTUS ... Eucalyptus; F Generation (F1, F2, F3, Etc); Humid 4 Months; Silviculture; Tree Breeding; ...**9.0341**

Rolling

STUDY OF THE PREPARATION OF THE SEED BED AND OF TEAM-CULTIVATION IMPLEMENTS FOR THE CULTIVATION OF FLOATING RICE ... Management; Non-dry 3 Months, Plus; Rotary Tillage, Rotary Hoe; Soil Preparation & Renovation; ...**6.0062**

EMPERIMENT 17-1 WEED CONTROL IN OIL PALM PLANTATIONS ... Diuron; Hand Tillage; Oilseed Crops; Pest, Disease & Weed Control; ...**9.0301**

EXPERIMENT 17-2. MECHANICAL MAINTENANCE AND MULCHING TREATMENTS OF OIL PALM PLANTATIONS ... Cultcontrol -other; Equipment; Mulches; Pest, Disease & Weed Control; ...**9.0302**

Rotary Tillage, Rotary Hoe

STUDY OF THE PREPARATION OF THE SEED BED AND OF TEAM-CULTIVATION IMPLEMENTS FOR THE CULTIVATION OF FLOATING RICE ... Management; Non-dry 3 Months, Plus; Soil Preparation & Renovation; ...**6.0062**

Seedbed Preparation

EFFECT OF TIME OF LAND PREPARATION AND PLANTING ON YIELD QUALITY OF FLUE CURED TOBACCO ... Continuous Humid 7 Months,Plus; Management; Nicotiana; Plowing; Soil Tillage Methods -other; Timing of Planting Procedures; ...**3.0145**

EFFECT OF LOCAL FARMER'S PRACTICE OF STEPPING ON GROUNDNUTS ... Management; Management Effects on Soils; Soil Compaction or Density; ...**3.0165**

IMPROVEMENT OF FORAGE PRODUCTION IN SAVANNAH ZONE BY MODIFICATION OF THE TRADITIONAL SYSTEM ... Broadcast Application; Costs; Dry Monsoon 4 M. or Less; Moist Monsoon; Stylosanthea; ...**4.0027**

METHODS OF PREPARING THE GROUND FOR PLANTATION OF RUBBER TREES ... Hand Tillage; Management; Phytopathology; Sand; Two Humid Seasons; ...**4.0236**

STUDY OF THE PREPARATION OF THE SEED BED AND OF TEAM-CULTIVATION IMPLEMENTS FOR THE CULTIVATION OF FLOATING RICE ... Management; Non-dry 3 Months, Plus; Rotary Tillage, Rotary Hoe; Soil Preparation & Renovation; ...**6.0062**

CROPPING TECHNIQUES FOR SANDY SOILS DRYING OUT AFTER FLOODING ... Humidity; Management; Sand; Soil Preparation & Renovation; Soil-water-plant Relationships; Surface Irrigation -general; ...**11.0042**

TRIALS OF MOTOR-TILLERS IN THE CONDITIONS OF INUNDATED RICE CULTIVATION ... Crop Production, Harvesting; Eutric Fluvisols; Eutric Gleysols; Hot Equatorial or Hot Tropical; Management; ...**11.0151**

DETERMINATION OF THE APPROPRIATE TECHNIQUES FOR CULTIVAION OF PLUVIAL RICE ... Chromic Vertisols; Humid 4 Months; Management Effects on Soils; ...**14.0065**

Soil Tillage Methods -other

TILLAGE SYSTEMS FOR TROPICAL AGRICULTURE ... Dry Monsoon 4 to 5 Months; ...**3.0021**

EFFECT OF TIME OF LAND PREPARATION AND PLANTING ON YIELD QUALITY OF FLUE CURED TOBACCO ... Continuous Humid 7 Months,Plus; Management; Nicotiana; Plowing; Seedbed Preparation; Timing of Planting Procedures; ...**3.0145**

STUDY THE ROLE OF TRACE-ELEMENTS IN THE NUTRITION OF THE COCONUT PALM ... Boron; Copper; Manganese; Sand; ...**4.0323**

MECHANIZATION OF TROPICAL AGRICULTURE ... Continuous Humid 7 Months,Plus; Design,Modify,Develop.of Equip; Ferralic Cambisols; Ferric Luvisols; Mathematical Models; Tractors and Accessories; ...**9.0184**

STUDY OF THE MODALITIES FOR CULTIVATION OF THE NEW VARIETIES (OF PLANTS) ... Labor Input; Management; Sorghum Vulgare (Grain); Time & Motion Studies; ...**11.0053**

Subsoiling

EFFECT OF TILLAGE ON THE MINERAL NUTRITION AND THE SUPPLY OF MOISTURE TO CROPS ... Drought Resistance; Management; Moisture Deficiency; Plowing; Surface -soil; ...**11.0027**

Soil Tillage Sequence / Method

See Pest Control Measures

Cultural Control

Soil Types

See Also Environments, Plant

SOIL GENESIS STUDY OF UPLAND DRIFT SOILS AND ASSOCIATED RESIDUAL SOIL ... Clay; Silt; Soil Chemical Properties; ...**3.0221**

AGRICULTURE RESEARCH IN DRAWDOWN AREAS ... Floods; Lakes & Reservoirs; ...**3.0237**

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Ferric Acrisols; Geology; Growth Stage of Plant; Management; Nursery Observational Plots; ...**4.0001**

MINERAL FERTILIZATION OF COFFEE ... Ferralic Cambisols; Geology; Management; ...**4.0006**

TYPOLOGY AND CLASSIFICATION OF FERRALYTIC SOILS IN AN EQUATORIAL TO TROPICAL CLIMATE ... Climate- Continental Sav.Trop.; Climate- Humid Equatorial; Soil Genesis; Soil Morphology, Profiles; ...**4.0037**

STUDY OF RIVULET FORMATION, OF INFILTRATION AND OF THEIR CONDITIONAL FACTORS ON THE KORHOGO WATERSHED ... Rain; Rill Erosion; Soil Moisture; Watersheds; ...**4.0045**

MINERAL FERTILIZATION ON COFFEE ... Continuous Humid; Eutric Fluvisols; Geology; Growth Stage of Plant; Management; Nursery Observational Plots; ...**4.0089**

DETERMINATION OF SOIL CHARACTERISTICS FOR IRRIGATION ... Irrigation; Plant Requirements -water; Two Humid Seasons; ...**4.0092**

MINERAL FERTILIZATION ON COFFEE ... Ferric Acrisols; Geology; Growth Stage of Plant; Management; Nursery Observational Plots; Two Humid Seasons-7 Month,Plus; ...**4.0112**

MINERAL FERTILIZATION ON COFFEE ... Ferralic Arenosols; Geology; Growth Stage of Plant; Management; Nursery Observational Plots; Two Humid Seasons; ...**4.0145**

EXPERIMENT ON PREPARATION OF THE SOIL BEFORE CROPPING ... Chemical Tillage or Nontillage; Continuous Humid; Deep Plowing; Ferralic Cambisols; Minimum Tillage; Plowing; ...**4.0195**

CORRECTION OF MINERAL DEFICIENCIES OF THE PRINCIPAL SOILS OF THE IVORY COAST ... Continuous Humid; Ferric Acrisols; Gleyic Acrisols; Movement, Availability; Soil Minerals -natural; ...**4.0200**

EXPERIMENT ON PREPARATION OF THE SOIL BEFORE CROPPING ... Chemical Tillage or Nontillage; Deep Plowing; Humid 5 Months; Minimum Tillage; Plowing; ...**4.0207**

MINERAL FERTILIZATION ON COFFEE ... Ferric Acrisols; Geology; Growth Stage of Plant; Management; Nursery Observational Plots; Two Humid Seasons-7 Month,Plus; ...**4.0331**

Soil Unit Classification

Acrisols

Ferric Acrisols

Gleyic Acrisols

Orthic Acrisols

Plinthic Acrisols

Arenosols

Cambic Arenosols

Ferralic Arenosols

Luvic Arenosols

Cambisols

Chromic Cambisols

Eutric Cambisols

Ferralic Cambisols

Vertic Cambisols

Ferralsols

Orthic Ferralsols

Rhodic Ferralsols

Xanthix Ferralsols

Fluvisols

Calcaric Fluvisols

Eutric Fluvisols

Gleyic Luvisols

Plinthic Luvisols

EXPERIMENT ON THE FREQUENCY OF INSECTICIDAL SPRAYING OF THE COTTON CROP ... DDT; Endrin; Fiber Crops; Insecta; Sequential, Daily, Weekly, Etc; ...**14.0089**

VARIETAL EXPERIMENTS ON HIBISCUS ... Ferric Luvisols; Humid 6 Months; Management; ...**14.0090**

Nitosols

Dystric Nitosols

SPECIFIC ROLE OF ORGANIC MATTER ... C/N Ratio; Dry Monsoon 4 M. or Less; Ferric Luvisols; Humid 4 Months; Plowing; Soil Fertility; ...**1.0002**

ACTION OF THE TILLAGE ON THE PHYSICAL FACTORS OF FERTILITY ... Dry Monsoon 4 M. or Less; Ferric Luvisols; Humid 4 Months; Management Effects on Soils; Soil Tillage; ... **1.0003**

POTENTIALITIES OF TROPICAL SOILS ... Dry Monsoon 4 M. or Less; Ferric Luvisols; Humid 4 Months; Luvic Arenosols; Rain; ...**1.0004**

CORRECTION OF DEFICIENCIES IN P2O5 ... Dry Monsoon 4 M. or Less; Ferric Luvisols; Humid 4 Months; Luvic Arenosols; ...**1.0005**

MAINTENANCE AND REGENERATION OF FERTILITY OF THE DEGRADED "TERRE DE BARRE" SOILS ... Humid 6 M.or Less; Organic Fertility; Soil Fertility; Source of Fertilizer; ...**1.0010**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0011**

STUDY OF THE MINERAL DEFICIENCIES OF THE COTTON PLANT ... Continuous Humid; Eutric Planosols; Management; Sulfur; ...**1.0013**

EXPERIMENTS ON POTASSIUM FERTILIZATION OF COTTON ... Management; Two Humid Seasons; ...**1.0014**

EXPERIMENTS WITH NATURAL PHOSPHATES OF ANECHO (TOGO) ... Management; Source of Fertilizer; Two Humid Seasons; ...**1.0015**

EXPERIMENTATION WITH VARIETIES OF COTTON ... Climate- Continental Sav.Trop.; Fiber Crops; Gleyic Luvisols; Insecticides -nonspecific; Management; Plinthic Luvisols; ... **1.0018**

HERBICIDE EXPERIMENTATION ON COTTON ... Fiber Crops; Humid 4 Months; Management; Pesticides -other; Preemerge Application; ...**1.0026**

EXPERIMENTS ON POTASSIUM FERTILIZATION OF COTTON ... Management; Two Humid Seasons; ...**1.0028**

TEST ON MAINTENANCE OF THE FERTILITY OF SOILS BY PROTECTION AND RESTITUTION OF ORGANIC MATTER ... Management; Organic Soils; Soil Fertility; ... **1.0029**

RESEARCH INTO METHODS FOR THE INTEGRATED CONTROL OF COTTON PESTS IN DAHOMEY ... Behavioral Ecology; Fiber Crops; Insect Viruses -other; Integrated Control; Olethreutidae; ...**1.0048**

INSECTICIDE EVALUATION TEST IN COTTON PLANTATIONS OF MIXTURES OF PROVEN INSECTICIDAL PREPARATIONS ... Endrin; Gardona; Humid 6 M.or Less; Pesticides -other; Synergism and Synergists; ...**1.0049**

INTEGRATED CONTROL OF CRYPTOPHLEBIA, BY ADDITION OF VIRUSES TO THE CHEMICAL INSECTICIDES ... Disease -biocontrol; Fiber Crops; Humid 6 M.or Less; Mode of Action; Peprothion; ...**1.0051**

EXPERIMENTS WITH VARIETIES OF HIBISCUS, CORCHORUS AND URENA ... Corchorus; Environments, Plant; Humid 6 M.or Less; Management; Two Humid Seasons; ... **1.0053**

PRODUCTION OF DOUBLE CRYPTO-HYBRIDS BETWEEN LOCAL IMPROVED WHITE MAIZE AND AN INTRODUCED MEXICAN VARIETY FROM TUXPENO STOCK ... Breeding & Genetics; F Generation (F1, F2, F3, Etc); Selfing; Two Humid Seasons; ...**1.0060**

CONSTITUTION OF A VARIETAL COMPOSITE OF MAIZE FROM INTRODUCED FOREIGN VARIETIES ... Breeding & Genetics; Polycross Test; Two Humid Seasons; ...**1.0061**

THE OBTAINING OF PURE LINES FROM FOUR LOCAL POPULATIONS OF WHITE MAIZE ... Breeding & Genetics; Disease Resistance; Lodging; Two Humid Seasons; ...**1.0062**

FABRICATION OF STERILE-MALE STRAINS OF MAIZE ADAPTED TO DAHOMEY ... Breeding & Genetics; Male Sterility; Two Humid Seasons; ...**1.0063**

INTRODUCTIONS AND TESTED COLLECTIONS OF FOREIGN VARIETIES OF MAIZE ... Breeding & Genetics; Disease Resistance; Lodging; Two Humid Seasons; ...**1.0064**

PRODUCTION OF A COMPOSITE OF YELLOW MAIZE FROM INTRODUCTIONS FROM ABROAD ... Breeding & Genetics; Reciprocal Recurrent Selection; Two Humid Seasons; ...**1.0065**

CORRECTION OF DEFICIENCIES IN P2O5 ... Two Humid Seasons; ...**1.0066**

CORRECTION OF DEFICIENCIES IN K2O ... Management; Two Humid Seasons; ...**1.0067**

MAINTENANCE OF P2O5 AND K2O FERTILITY ... Soil Fertility; Two Humid Seasons; ...**1.0068**

INTRODUCTION OF FOREIGN VARIETIES OF MANIOC ... Management; Manihot; Mosaic Viruses; Starch; Two Humid Seasons; Virus Resistance; ...**1.0069**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Mangifera; Persea; Psidium; Two Humid Seasons; ...**1.0070**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANO-GUINEAN ZONE ... Management; Passiflora; Plant Virus - general; Sapotaceae; ...**1.0071**

FERTILIZATION OF THE OIL PALM IN FERRALYTIC SOILS ON "CONTINENTAL TERMINAL" SOILS ("TERRES DE BARRE") ... Deficiencies; Light Quantity or Intensity; Management; Rain; Soil Types; Two Humid Seasons; ...**1.0078**

LONG TERM SOIL FERTILITY RESTORATIVE PROPERTIES OF NATURAL BUSH, TREE, GRASS AND LEGUME FALLOWS ... Crop Contribution to Soil Fert; Fallowing; Manihot; Orthic Ferralsols; Pueraria; Soil Analysis; ...**9.0366**

ECOLOGICAL STUDY OF THE ORCHARD - SOUDANIAN ZONE ... Bromeliaceae; Environments, Plant; Management; Musa; Persea; ...**11.0144**

EVOLUTION OF SOILS IN THE COURSE OF CULTIVATION ... Fertilizer Technology; Humid 4 Months; Management Effects on Soils; Soil Tillage; ...**11.0154**

STUDY THE POTENTIAL FERTILITY OF SOILS ... Management; Moist Monsoon 0 to 3 Months; Movement, Availability; ...**13.0001**

MANIOC (CASSAVA) - PERIOD FOR PROPAGATION BY CUTTINGS AND DATE OF HARVEST ... Carbohydrates; Harvest and Storage; Management; Manihot; Moist Monsoon 0 to 3 Months; Starch; ...**13.0002**

PRODUCTION OF MAIZE AND MANIOC IN ASSOCIATED CULTIVATION ... Companion Cropping; Competition; Management; Manihot; Moist Monsoon 0 to 3 Months; Timing of Planting Procedures; ...**13.0003**

FERTILIZATON OF MANIOC ... Management; Manihot; Moist Monsoon 0 to 3 Months; Starch; ...**13.0004**

STUDY OF THE TOGO NATURAL PHOSPHATE AS A BASIC FERTILIZER ... Costs; Moist Monsoon 0 to 3 Months; Movement, Availability; Source of Fertilizer; ...**13.0005**

MODALITIES FOR USE OF THE TOGO PHOSPHATE ... Moist Monsoon 0 to 3 Months; Movement, Availability; Source of Fertilizer; ...**13.0006**

TILLAGE AND FERTILIZATION ... Disking; Management Effects on Soils; Moist Monsoon 0 to 3 Months; ...**13.0007**

STUDY OF MAINTENANCE FERTILIZATIONS ... Continuous Cropping; Management; Moist Monsoon 0 to 3 Months; Movement, Availability; ...**13.0008**

NITROGEN BALANCE - NITROGENOUS FERTILIZATION AND ORGANIC MANURING ... C/N Ratio; Moist Monsoon 0 to 3 Months; Plant Residues -other; Soil Types; ... **13.0009**

EXPERIMENT FOR (SELECTION BY) ELIMINATION OF SPECIES OF EUCALYPTUS ... Eucalyptus; Ferric Luvisols; Gleyic Luvisols; Humid 4 Months; Variation and Selection; ... **14.0039**

Eutric Nitosols

HERBICIDE EXPERIMENTATION ON COTTON ... Continuous Humid; ER 5461; GS 16068; MSMA; Postemerge Application; ...**1.0012**

CROPS SEQUENCE TRIAL ... Disease Resistance; Fallowing; Management; Moist Monsoon 0 to 3 Months; ...**3.0200**

EFFECTS OF DIFFERENT LEVELS OF NITROGEN ON THE GROWTH AND FIBRE YIELD OF KENAF, HIBISCUS CANNABINUS L. ... Fibers; Management; Moist Monsoon 0 to 3 Months; ...**3.0201**

EFFECTS OF FERTILIZER APPLICATION (NPK) ON THE GROWTH FIBRE AND SEED YIELDS OF KENAF, HIBIS-

Planosols

Eutric Planosols

Solodic Planosols

Regosols

Calcaric Regosols

Eutric Regosols

Solonchaks

Orthic Solonchaks

Solonetz

Orthic Solonetz

Vertisols

Chromic Vertisols

Pellic Vertisols

Soil X-ray

See Soil Analysis

Soil-borne

See Phytopathology

Plant Disease Transmission

Soil-water-plant Relationships

SOIL CHEMICAL AND PHYSICAL CHANGES UNDER CONTINUOUS CULTIVATION ... Infiltration; Management; Manihot; Sand; Trace Metals; ...**9.0048**

RIVER OBUBA-OPA WATERSHED PROJECT - RUN OFF AND EROSION STUDIES ... Erosion Control; Management Effects on Soils; Rain; Rain Amount; Raindrop Impact; ...**9.0050**

WATER USE EFFICIENCY OF MAIZE IN SOME NIGERIAN SOILS ... Evapotranspiration; Nuclear Moisture Meters; Radioisotope Tracers; Soil Profile Studies; ...**9.0193**

CROPPING TECHNIQUES FOR SANDY SOILS DRYING OUT AFTER FLOODING ... Humidity; Management; Sand; Seedbed Preparation; Soil Preparation & Renovation; Surface Irrigation -general; ...**11.0042**

MOISTURE BALANCE BENEATH CUT CROPS, BARE SOIL AND FALLOW ... Cover Crops; Fallowing; Humidity; Management; Soil - Bare; ...**11.0061**

MOISTURE STUDIES OF THE COTTON-GROWING SOILS OF SINE SALOUM ... Management; Nitrates; Soil Moisture; ...**11.0168**

STUDY OF RIVULET FORMATION AND OF EROSION ON VERTIC SOIL ... Eutric Regosols; Management Effects on Soils; Soil - Bare; ...**14.0041**

Solanum
See Plants - Dicots
Solanaceae

Solar Light
See Environments, Plant

Solar Processes
See Materials

Solodic Planosols
See Soil Unit Classification
Planosols

Solonchaks
See Soil Unit Classification

Solonetz
See Soil Unit Classification

Somatotrophin
See Hormones

Sorghum Vulgare (Forage)
See Plants - Monocots
Gramineae

Sorghum Vulgare (Grain)
See Plants - Monocots
Gramineae

Sorghum Vulgare (Syrup)
See Plants - Monocots
Gramineae

Soups
See Food Science and Technology

Source of Fertilizer
See Fertilizer Technology

Space Competition
See Environments, Plant
Competition

Spirochetes

Leptospira
LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Histology and Cytology; Leptospiroses; Pathology -mammal; Veterinary Medicine; ...**11.0104**

Spoilage of Food
See Food Science and Technology

Spots
See Plant Diseases

Sprinkler Irrigation
See Irrigation

Stable Isotopes
See Isotopes

Starch
See Carbohydrates

Sterculiaceae
See Plants - Dicots

Sterile Release
See Pest Control Measures
Biological Control

Storage
See Also Environments, Plant
See Also Seed

IMPROVEMENT OF THE PROCEDURES FOR STORAGE AND CONSERVATION OF MAIZE IN A RURAL ENVIRONMENT ... Bins; Humidity; Jars; ...**1.0059**

THE PRESERVATION OF MAIZE ON THE COB IN FARMERS' CRIBS ... Barriers & Weirs; Control of Nuisance Species; DDVP; Phosphorothioate Cpds.; Tenebrionidae; ...**3.0211**

STORAGE OF MAIZE IN A CONCRETE SILO ... Buildings, Farm; Fumigant; Phostoxin; Temperature -air; ...**3.0212**

THE FATE AND POSSIBLE NUTRITIONAL AND TOXICOLOGICAL SIGNIFICANCE OF METHYL BROMIDE RESIDUES IN FUMIGATED COCOA BEANS ... Beverage Crops; Carbon; Industrial, Structural Insects; Methyl Bromide; Persistance of Residues; ...**3.0216**

STORAGE AND CONSERVATION OF COFFEE ... Harvest and Storage; ...**4.0034**

STORAGE AND CONSERVATION OF COCOA ... Harvest and Storage; ...**4.0035**

PHYSIOLOGY OF ROOT, TUBER CROPS AND VEGETABLES ... Breeding & Genetics; Ferralic Cambisols; Ipomoea; Plant Morphology; ...**9.0162**

YAM BREEDING ... Breeding & Genetics; Disease Resistance; Ferric Luvisols; Nematode Resistance; Proteins; Starch; ...**9.0186**

ORIGIN OF MOULD DETERIORATION OF PALM KERNELS ... Continuous Humid 7 Months,Plus; Molds; Phytopathology; ...**9.0337**

IMPROVEMENT OF THE STORAGE FACILITIES FOR AGRICULTURAL PRODUCE IN THE SAHELO-SOUDANESE ZONE ... Costs; ...**11.0022**

Deep Freeze Storage
POLLEN STORAGE (OIL PALM) ... Breeding & Genetics; Drying; Pollens; Pollination & Fertilization; ...**9.0289**

Storage Changes
See Feed Science and Technology
Quality Evaluation of Feed
See Plant Resistance

Storage Rot
See Plant Diseases
Rots

Stored Grain Insects
See Entomology, Applied
Industrial, Structural Insects

Straw
See Feed Science and Technology
By-products- Plant(Vegetative)

Streaks
See Plant Diseases

Streams
STUDY THE RATES OF FLOW OF THE DIFFERENT WATER-COURSES IN THE IVORY COAST ... Discharge; Floods; Flow Characteristics -water; ...**4.0042**

HYDROLOGICAL RATES OF FLOW, SOLIDS CARRIED BY AND CHEMISTRY OF THE WATERS OF THE SAN PEDRO, NERO, AND BRIME RIVERS ... Discharge; Flow Characteristics -water; Gaging; Water Quality; ...**4.0043**

STUDY OF REPRESENTATIVE WATERSHEDS IN THE FRAMEWORK OF MULTIDISCIPLINARY ACTIVITIES IN THE IVORY COAST ... Precipitation Gages; Sediment Yield; Water Runoff; Water Table; ...**4.0044**

DATE-PALM SELECTION. PHYTOTECHNICAL AND ECOLOGICAL RESEARCH WORK ... Calcaric Fluvisols; Groundwater; Humid 1 Month; Management; Moisture Deficiency; Phoenix; ...**7.0007**

DETERMINATION OF PRODUCTION OF FISH OF CONTINENTAL WATERS ... Commercial Fishing; Fish; Lakes & Reservoirs; Population Dynamics; ...**11.0073**

GENERAL ECOLOGY OF ESTUARINE AND FRESH WATERS ... Estuaries; Growth Rate; Population Dynamics; Water Quality; ...**12.0005**

Streptomycin
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Streptothricosis
See Animal Pathology

Strongyloidea
See Aschelminthes
Nematoda

Strongylosis
See Animal Pathology

Structural Insects
See Entomology, Applied
Industrial, Structural Insects

Stunt Diseases
See Plant Diseases

Stylosanthea
See Plants - Dicots
Leguminosae

Subsoil Application
See Application Methods

Subsoiling
See Soil Tillage

Subsurface Runoff
See Water Movement
Water Runoff

Sucrose
See Carbohydrates

Sugar -nonspecific
See Carbohydrates

Sugar Crops
See Agronomy
See Entomology, Applied
Agronomic Pests on
See Weeds
Control of Weeds in ...

Sugar Derivatives
See Carbohydrates

Sulfates
See Sulfur

Sulfur
See Also Isotopes
Radioactive Isotopes
See Also Pesticides
Insecticide - Fungicide
See Also Soil Nutrients/Fertilizers

STUDY THE MINERAL NUTRITION OF OIL PALM ACCORDING TO THE PLANT MATERIAL ... Calcium; Deficiencies; Management; Phosphorus; ...**4.0299**

BIOCHEMICAL INVESTIGATIONS IN GRAIN LEGUMES ... Cooked Quality of Food; Fats - Lipids & Oils; Hydrogen Cyanide; Nutritive Value of Food; Pulse Crops; Tryptophane; ...**9.0177**

TO SCREEN SULPHUR-FREE FUNGICIDES FOR EFFECTIVENESS IN CONTROLLING MILDEWS IN CUCURBITS ... Cucurbita; Fungicides -nonspecific; Mildew Diseases; Phytopathology; Phytotoxicity; ...**9.0283**

MEASUREMENT OF THE MINERAL UPTAKE OF EACH OF THE PRINCIPAL FOOD CROPS OF SENEGAL (MILLET, MAIZE, RICE, GROUNDNUTS, SORGHUM) ... Calcium; Magnesium; Nitrogen; Potassium; Sorghum Vulgare (Grain); ...**11.0059**

Sulfates
STUDY OF THE INFLUENCE OF THE ANIONS SO4 AND CL ... Cover Crops; Soil - Bare; ...**1.0077**

COTTON AGRONOMY ON THE BLACK SOILS, ACCRA PLAINS ... DDT; Formulation, Fertilizer; Preforan; Soil Moisture; Synergism and Synergists; ...**3.0005**

SUGARCANE AGRONOMY ON THE BLACK SOILS OF THE ACCRA PLAINS ... Bladex; Growth Stage of Plant; Saccharum; Simazine; Space Competition; ...**3.0006**

GERMINATION AND SURVIVAL OF SPORANGIA AND BEHAVIOUR OF ZOOSPORES OF PHYTOPHTHORA PALMIVORA ... Chlorides; Extract Composition; Glutamic Acid; Low Temp. Above 0 C; Phytophthora; ...**3.0061**

USE OF ISOTOPES IN STUDIES ON THE NUTRITION OF GROUNDNUTS ... Broadcast Application; Management; Nitrogen Fixation; Sulfur; ...**3.0219**

STUDY THE INFLUENCE OF THE ANIONS S04 AND CL IN THE FERTILIZATION OF THE OIL PALM ... Chlorine; Magnesium; Management; Sulfur; ...**4.0293**

STUDY OF THE ROLE OF THE ANIONS SO4 AND CL IN THE FERTILIZATION OF THE COCONUT PALM ... Chlorine; Deficiencies; Nitrates; ...**4.0319**

STUDY FORMS OF NITROGENOUS FERTILIZERS FOR THE COCONUT PALM ... Cocos; Management; Nursery Observational Plots; ...**4.0320**

SUGAR CANE NITROGEN FERTILIZER TRIAL ... Management; Saccharum; ...**9.0001**

NITROGEN FERTILIZATION IN FLOODED FIELDS - METHODS AND TIMING OF NITROGEN APPLICATION ... Broadcast Application; Eutric Gleysols; Humid 6 Months; Sodium; Timing of Application -other; ...**9.0011**

EVALUATION OF NITROGEN FERTILIZERS ... Formulation, Fertilizer; Soil pH; ...**9.0049**

EXPERIMENTS WITH FERTILIZERS IN PLANTATIONS OF EUCALYPTUS CAMALDULENSIS ... Eucalyptus; Phosphates; Potassium; Silviculture; Sulfur; ...**13.0019**

Sumithion
See Pesticides
Insecticides

Summer G
See Climate- Cool Winter Tropical

Supplements, Feed Additives
See Feed Science and Technology

Supply
See Economics
Production and Processing

Surface -soil
See Application Methods

Surface Irrigation -general
See Irrigation

Surveys
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See Forestry
See Phytopathology

Swamps - Marshes
FERTILIZER STUDIES ON IRRIGATED AND UPLAND RICE ... Costs; Management; Placement; Sand; Timing of Application -other; ...**5.0017**

COSTS AND METHODS OF DEVELOPING SMALL SWAMPS FOR RICE CULTIVATION ... Costs; Crop Production, Harvesting; Management; Time & Motion Studies; ...**5.0018**

PRODUCTIVITY OF NATURAL FORESTS OF NIGERIA ... Forests; Measurement of Trees & Stands; Productivity; Silviculture; Wild Type Genotype; ...**9.0080**

THE MINERAL REQUIREMENTS OF RICE ... Formulation, Fertilizer; Management; ...**12.0010**

Swine Husbandry
See Animal Husbandry

Swine Industry
See Ag Industries & Agribusiness

Swine Rations
See Feed Science and Technology
Animal Rations

Swollen Shoot Virus
See Viruses, Plant

Symbionts, Plant Diseases
See Phytopathology

Synergism and Synergists
See Pest Control Measures

Synthetic Soils
See Environments, Plant
Soil Composition

Synthetic Varieties & Blends
See Genetics
Genetic & Breeding Methods

Systemic Action (Plant)
See Pest Control Measures

Systemic Application
See Application Methods

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See Pesticides
Herbicides

Tabanidae
See Insecta
Diptera

Tachinidae
See Insecta
Diptera

Taenia
See Platyhelminthes
Cestoda

Tannin
TANNIN EXTRACTION ... Chemical Materials; Extract Composition; Finishes of Textiles; Forest Product Development; Leather; ...**3.0102**

OIL PALM - STUDY THE CHARACTERS AND THE FERTILITY OF THE HYBRID E. MELANOCOCCA X E. GUINEENSIS ... Cercospora; Endodermis; Interspecific Cross; Two Humid Seasons; ...**4.0287**

STUDY THE ROOT SYSTEM OF THE OIL PALM ... Breeding & Genetics; Cell Wall; Extract Composition; Management; Plant Resistance; ...**4.0297**

Taxonomy, Animal
ECOLOGY OF RODENTS OF THE SAVANNAH - ADAPTATION OF THESE RODENTS TO THE CULTIVATED ENVIRONMENT ... Habitat Studies; Population Dynamics; Rodenticides; ...**4.0059**

POPULATION DYNAMICS OF PLANT PARASITIC NEMATODES IN CULTIVATED SOIL ... Plant Nematodes -nonspecific; Population Dynamics; Soil-borne; ...**9.0044**

SURVEY AND CONTROL OF INSECT PESTS ON TIMBER ... Coleoptera -other; Forestry Insects; ...**9.0091**

TAXONOMY, BIOLOGY AND CONTROL OF BORERS OF MELIACEAE ... Forestry Insects; Insecta -other; Meliaceae -other; ...**9.0092**

INSECT PESTS ASSOCIATED WITH CASHEW IN NIGERIA ... Insecta -other; Nuts; Pests; Surveys; Thysanoptera; ...**9.0152**

Trace Metals

YAM STORAGE TRIAL ... Harvest and Storage; Nutrition in Disease; Soft Rot; ...**9.0042**

SOIL CHEMICAL AND PHYSICAL CHANGES UNDER CONTINUOUS CULTIVATION ... Infiltration; Management; Manihot; Sand; ...**9.0048**

SOIL ACIDITY AND THE GROWTH OF THE OIL PALM ... Foliar Application; Lime; Management; Sand; Soil pH; ...**9.0295**

TRACE ELEMENTS IN THE NUTRITION OF THE OIL PALM ... Boron; Copper; Management; Movement, Availability; Sand; ...**9.0296**

EXPERIMENT 9-2 - TRACE ELEMENT EXPERIMENT ... Boron; Foliar Application; Management; Molybdenum; Zinc; ... **9.0303**

STUDY OF MINERAL DEFICIENCY COMPLEXES ... Calcium; Forage, Pasture or Range; Inorganic Elements in Feeds; Management; Phosphorus; Water Utilization -animal; ...**11.0082**

Tractors and Accessories

See Farm Machinery, Equip & Power

Translocation

See Plant Physiology
Metabolism

Transpiration

See Water Supply

Transpiration & Evaporation

See Plant Physiology
Metabolism

Transplanting Methods

See Planting Methods

Transportation

DETAILED RECONNAISSANCE SOIL SURVEY OF CAPE COAST REGION, CENTRAL AND WESTERN REGION OF GHANA ... Geology; Land Use -agriculture; Roads and Highways; Soil Morphology, Profiles; Soil Physical Properties; Soil Survey; ...**3.0222**

INTERNAL MARKETING OF PALM OIL AND PALM KERNELS ... Harvest and Storage; Marketing; Marketing Organizations; Plant Industries -other; ...**9.0332**

AGRONOMIC-ECONOMIC STUDY OF THE NATURAL PHOSPHATES OF TOGO ... Costs; Movement, Availability; Natural Resources Economics; Source of Fertilizer; ...**13.0043**

Railroads

TESTING NEW SPECIES FOR USE AS RAIL SLEEPERS ... Wood; Wood Preservatives; ...**3.0098**

THE SUITABILITY OF NIGERIAN TIMBERS FOR RAILWAY SLEEPERS ... Chemical Materials; Corrosion, Deterioration; Mechanical Properties; Wood; Wood Preservatives; ...**9.0104**

Trap Crops

See Pest Control Measures
Cultural Control

Treatment

See Medicine/Psyc.- General Topics

Tree Breeding

See Forestry
Breeding & Genetics

Trees & Shrubs

See Weeds
Control of Plants ...

Trematoda

See Platyhelminthes

Trends and Cycles

See Economics

Triazines -nonspecific

See Pesticides

Trichogrammatidae

See Insecta
Hymenoptera

Trifluralin

See Pesticides
Herbicides

Triplochiton

See Plants - Dicots
Sterculiaceae

Tripsaceae -other

See Plants - Monocots
Gramineae

Tripsacum

See Plants - Monocots
Gramineae

Triticum

See Plants - Monocots
Gramineae

Trypanosoma

See Protozoa

Trypanosomiases

See Animal Pathology

Trypsin

See Enzymes

Tryptophane

See Amino Acids

Tuber Rot

See Plant Diseases
Rots

Tuberculosis

See Animal Pathology

Tungro Virus

See Viruses, Plant

Tylenchoidea

See Aschelminthes
Nematoda

Viral Vaccines

IMMUNE RESPONSE TO NEWCASTLE DISEASE VACCINES ... Chicken, Domestic; Evaluation, Efficacy; Globulins; Hemagglutination Inhibition; Immunity; Newcastle Disease; ... **3.0024**

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Immunity; Rinderpest; Veterinary Medicine; ...**8.0004**

RINDERPEST PROPHYLAXIS - ESTABLISHMENT OF A THERMO-RESISTANT VACCINE ... Immunity; Prophylaxis; Pseudomyxoviruses; Rinderpest; Veterinary Medicine; ... **11.0096**

POX OF SMALL RUMINANTS - EPIDEMIOLOGICAL AND PROPHYLACTIC RESEARCH ... Epidemiology of Disease; Poxviruses; Sheep Scab or Sheep Pox; ...**11.0098**

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Diagnosis; Fetus; Urogenital System; ... **11.0102**

AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT ... Fowl Pox; Immunity; Newcastle Disease; Salmonella; Veterinary Medicine; ...**11.0115**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE ... Fowl Cholera; Fowl Typhoid Pullorum Disease; Myxoviruses, True; Poultry -nonspecific; Salmonella; Veterinary Medicine; ... **11.0117**

Vagina

See Reproductive Physiology

Vapam

See Pesticides

Insecticides

Variation and Selection

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Breeding & Genetics

Vascular Tissue

See Plant Tissues

Vascular Wilt

See Plant Diseases

Wilts

Vectors

See Phytopathology

Plant Disease Transmission

Vegetable & Vegetable Products

See Food Science and Technology

Vegetables

See Entomology, Applied

Horticulture Insects on

Vegetables -other

See Horticulture

Verbenaceae

See Plants - Dicots

Vertebrate Nutrition

NUTRITIONAL STUDIES WITH PIGS USING DIETS CONTAINING MAINLY LOCALLY PRODUCED FEED STUFFS ... Dry Monsoon 4 to 5 Months; Management; Swine Rations; ...**3.0015**

THE EFFECT OF LEVEL OF WHEAT BRAN ON NUTRIENT METABOLISM BY PIGS ... Bran; Fishmeal; Management; Wheat; ...**3.0030**

STUDIES OF THE GUINEA FOWL (NUMIDIA MELEAGRIS) ... Numidia; Poultry Husbandry; Sexing Methods; ...**3.0058**

MICROORGANISMS IN THE RUMEN AND THEIR ROLE IN NUTRITION ... Cellulase; Cellulose; Goat Husbandry; In Vivo--see Also Feed Rations; Rumen Bacteria; Taxonomy, Plant; ... **9.0025**

IMPROVEMENT OF THE PRODUCTION OF BEEF - STUDY OF THE SEXUAL CYCLE OF SENEGAL FULANI (GOBRA) ZEBU CATTLE ... Breeding & Genetics; Pregnancy; Semen Composition; Sexual Cycle; ...**11.0077**

SEASONAL VARIATIONS OF THE PASTURES AND NUTRITION OF CATTLE ... Forage, Pasture or Range; In Vivo--see Also Feed Rations; Lignin; Nutritive Values -plant; ...**11.0085**

Anim. Nutrient Requirements.

Egg Production

LOCAL LEAFMEAL AS SOURCES OF EGG YOLK COLOUR ... Chicken, Domestic; Eggs; Management; Medicago; Processing Feeds; ...**3.0033**

PROTEIN REQUIREMENT OF CHICKENS IN TROPICAL ENVIRONMENT - PROTEIN LEVEL FOR CHICKS ... Chicken, Domestic; Feed Proteins & Amino Acids; Management; Poultry Rations; ...**3.0037**

THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF THE LAYING HEN ... Calcium; Chicken, Domestic; Inorganic Elements in Feeds; Management; Phosphorus; Poultry Rations; ...**9.0021**

Diet Components -animal

Feed Proteins & Amino Acids

PROTEIN REQUIREMENT OF CHICKENS IN TROPICAL ENVIRONMENT - PROTEIN LEVEL FOR CHICKS ... Chicken, Domestic; Management; Poultry Rations; ...**3.0037**

EVALUATION OF THE NUTRITIVE QUALITY OF BEANS ... Management; Nutritive Value of Food; Phaseolus; Vegetable & Vegetable Products; ...**9.0207**

Inorganic Elements in Feeds

STUDIES ON IRON SUPPLEMENT FOR PIGLETS ... Growth Rate; Iron; Management; Mineral Blocks, Salt Blocks; Supplements, Feed Additives; Vitamins; ...**3.0032**

THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF THE LAYING HEN ... Calcium; Chicken, Domestic; Egg Production; Management; Phosphorus; Poultry Rations; ...**9.0021**

STUDY OF MINERAL DEFICIENCY COMPLEXES ... Calcium; Forage, Pasture or Range; Management; Phosphorus; Water Utilization -animal; ...**11.0082**

BIOCHEMICAL DETERMINATION ON HERDS OF CATTLE AT THE DIFFERENT PERIODS OF THE YEAR ... Environments, Animal; Management; Metabolism; Water Utilization -animal; ...**11.0083**

Malnutrition

GASTRO-INTESTINAL PARASITISM IN THE RED GOAT ... Coccidia; Digestive Diseases -animal; Feces; Strongyloidea; Treatment; ...**8.0006**

STUDY OF MINERAL DEFICIENCY COMPLEXES ... Calcium; Forage, Pasture or Range; Inorganic Elements in Feeds; Management; Phosphorus; Water Utilization -animal; ...**11.0082**

Nutrition in Disease

POULTRY DISEASE INVESTIGATION ... Histology and Cytology; Poultry -nonspecific; Poultry Husbandry; ...**3.0001**

GASTRO-INTESTINAL PARASITISM IN THE RED GOAT ... Coccidia; Digestive Diseases -animal; Feces; Malnutrition; Strongyloidea; Treatment; ...**8.0006**

Vertebrate Physiology

Behavior -vertebrate

HYDROBIOLOGY RESEARCHES IN THE VOLTA BASIN ... Behavioral Ecology; Fish Food Supply; Plankton; Water Environment; ...**3.0236**

Blood and Lymph System

CONTROL OF PNEUMONIA-ENTERITIS COMPLEX IN GOATS BY USE OF "PEC" TISSUE VACCINE ... Immunity; Pneumonia; Sheep Husbandry; Vaccines; Veterinary Medicine; ...**9.0019**

CHANGES IN THE MINERAL CONTENT OF SOIL AND FEED AS RELATED TO THE BLOCK COMPOSITION OF FARM ANIMALS ... In Vitro Feed Studies; Metabolism; Mineralogy; Soil Environment; ...**9.0028**

Digestive System

GASTRO-INTESTINAL PARASITISM IN THE RED GOAT ... Coccidia; Digestive Diseases -animal; Feces; Malnutrition; Strongyloidea; Treatment; ...**8.0006**

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Diagnosis; Fetus; Urogenital System; Viral Vaccines; ...**11.0102**

Immunology

TRYPANOSOMIASES - IMMUNOLOGY ... Diagnosis; Epidemiology of Disease; Trypanosoma; Trypanosomiases; Veterinary Medicine; ...**11.0091**

RINDERPEST PROPHYLAXIS - SEROLOGICAL SURVEILLANCE OF IMMUNITY ... Globulins; Pseudomyxoviruses; Rinderpest; Serology; Veterinary Medicine; ...**11.0095**

Metabolism

CHANGES IN THE MINERAL CONTENT OF SOIL AND FEED AS RELATED TO THE BLOCK COMPOSITION OF FARM ANIMALS ... Blood and Lymph System; In Vitro Feed Studies; Mineralogy; Soil Environment; ...**9.0028**

BIOCHEMICAL DETERMINATION ON HERDS OF CATTLE AT THE DIFFERENT PERIODS OF THE YEAR ... Environments, Animal; Inorganic Elements in Feeds; Management; Water Utilization -animal; ...**11.0083**

Respiratory System

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Bovidae; Etiology; Pleuropneumonia Group; Pulmonary Syndrome; Rinderpest; ...**11.0097**

RESPIRATORY AND DIGESTIVE DISEASES OF SMALL RUMINANTS - AETIO-PATHOGENESIS ... Digestive Diseases -other; Etiology; Pasteurella; Pneumonia; ...**11.0107**

Skin or Special Derivatives

CONTROL OF SKIN DISEASES OF FARM ANIMALS ... Dry Monsoon 4 to 5 Months; Skin Diseases -other; Veterinary Medicine; ...**3.0017**

STUDIES INTO SKIN DISEASES OF FARM ANIMALS ... Besnoitiosis; Demodicosis; Mycosis; Streptothricosis; Veterinary Medicine; ...**3.0055**

STREPTOTHRICOSIS - EXPERIMENTS IN TREATMENT ... Chlorhexidine; Dermatophilus; Immunity; Streptothricosis; Veterinary Medicine; ...**11.0113**

Urogenital System

BIOLOGY AND PHYSIOLOGY OF A SAVANNAH RODENT ... Breeding & Genetics; Hormones; Pregnancy; Sexual Cycle; Vagina; ...**4.0060**

THE OBTAINING OF CELL LINES NECESSARY TO SUPPLY THE REQUIREMENTS FOR THE PRODUCTION OF VACCINES AND FOR DIAGNOSTIC PURPOSES ... Bovine Foetal Hepatocytes; Diagnosis; Fetus; Viral Vaccines; ...**11.0102**

LEPTOSPIROSIS - EPIDEMIOLOGICAL SURVEY ... Epidemiology of Disease; Histology and Cytology; Leptospiroses; Pathology -mammal; Veterinary Medicine; ...**11.0104**

Visual Organs

BOVINE OCULAR THELAZIOSIS - TREATMENTS ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Cyanides; Muscidae; Tetramisole; Veterinary Medicine; ...**11.0087**

BOVINE OCULAR THELAZIOSIS - AETIOLOGY ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Epidemiology of Disease; Muscidae; Veterinary Medicine; ...**11.0088**

HELMINTHOSES OF FARM ANIMALS - TREATMENTS ... Bovine Ocular Thelaziosis; Treatment; Trematoda; Veterinary Medicine; ...**11.0089**

Vertic Cambisols

See Soil Unit Classification

Cambisols

Vertisols

See Soil Unit Classification

Veterinary Entomology

See Entomology, Applied

Veterinary Medicine

CONTROL OF SKIN DISEASES OF FARM ANIMALS ... Dry Monsoon 4 to 5 Months; Skin or Special Derivatives; Skin Diseases -other; ...**3.0017**

STUDIES WITH THE SMALL RUMINANTS ... Bovidae; Dry Monsoon 4 to 5 Months; Sheep Husbandry; ...**3.0019**

HELMINTH PARASITES OF PIGS IN GHANA ... Management; Population Dynamics; Taenia; ...**3.0029**

STUDIES INTO SKIN DISEASES OF FARM ANIMALS ... Besnoitiosis; Demodicosis; Mycosis; Skin or Special Derivatives; Streptothricosis; ...**3.0055**

IMMUNOLOGICAL STUDIES INTO ANIMAL TRYPANOSOMIASIS ... Muridae; Trypanosomiases; ...**3.0056**

EXPERIMENT ON FATTENING OF FULANI ZEBU CATTLE ON STYLOSANTHES PASTURE WITH OR WITHOUT A FODDER SUPPLEMENT ... Cattle Rations; Continuous Humid; Forage, Pasture or Range; Legumes; Rice; Stylosanthea; ...**4.0015**

OBSERVATIONS ON GROWTH AND PERFORMANCE ON NUBIAN GOATS ... Berenil; Goat Husbandry; Muscidae; Trypanosomiases; Veterinary Entomology; ...**5.0012**

OBSERVATION ON GROWTH AND PERFORMANCE OF SOME EUROPEAN BREEDERS OF CATTLE AND THOSE OF BRAHMA CATTLE ... Berenil; Management; Muscidae; Pesticides -other; Trypanosomiases; Veterinary Entomology; ...**5.0021**

GASTRO-INTESTINAL PARASITISM OF ZEBU CATTLE ... Feces; Strongyloidea; ...**8.0002**

DISEASES OF THE RED GOAT ... Evaluation, Efficacy; Immunity; Rinderpest; ...**8.0004**

BACTERIOLOGICAL INQUIRY ON SLAUGHTERED ANIMALS ... Bacteria; Carcass Evaluation; Melioidosis; Mycobacterium Tuberculosis; Tuberculosis; ...**8.0005**

CONTROL CAMPAIGN AGAINST TSETSE FLIES AND ANIMAL TRYPANOSOMIASES ... Barriers & Weirs; DDT; Muscidae; Trypanosomiases; Veterinary Entomology; ...**8.0021**

CONTROL OF PNEUMONIA-ENTERITIS COMPLEX IN GOATS BY USE OF "PEC" TISSUE VACCINE ... Blood and Lymph System; Immunity; Pneumonia; Sheep Husbandry; Vaccines; ...**9.0019**

DISEASE RESISTANCE OF LOCAL CHICKENS ... Breeding & Genetics; Coccidioides; Coccidiosis; Disease Resistance; Leucosis; ...**9.0029**

RESISTANCE TO TRYPANOSOMIASIS IN CATTLE ("METIS DE BAMBEY") BREED ... Beef Husbandry; Parasite Resistance; Trypanosoma; Trypanosomiases; ...**11.0037**

BOVINE OCULAR THELAZIOSIS - TREATMENTS ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Cyanides; Muscidae; Tetramisole; ...**11.0087**

BOVINE OCULAR THELAZIOSIS - AETIOLOGY ... Blindness -nonspecific; Bovine Ocular Thelaziosis; Epidemiology of Disease; Muscidae; ...**11.0088**

HELMINTHOSES OF FARM ANIMALS - TREATMENTS ... Bovine Ocular Thelaziosis; Treatment; Trematoda; Visual Organs; ...**11.0089**

HELMINTHOSES OF FARM ANIMALS - EPIDEMIOLOGY ... Epidemiology of Disease; Pest Control Measures; Population Dynamics; ...**11.0090**

TRYPANOSOMIASES - IMMUNOLOGY ... Diagnosis; Epidemiology of Disease; Immunology; Trypanosoma; Trypanosomiases; ...**11.0091**

TRYPANOSOMIASES - CONTROL CAMPAIGN AGAINST THE VECTORS ... Dieldrin; Muscidae; Surveys; Trypanosoma; Trypanosomiases; Veterinary Entomology; ...**11.0092**

TRYPANOSOMIASES - TREATMENT ... Pesticides -other; Treatment; Trypanosoma; Trypanosomiases; ...**11.0093**

Abortion

Autopsy

Digestive Diseases -animal

Hemorrhagic

Mastitis

Viability

See Seed

Vibrio Fetus

See Bacteria

Vibriosis

See Animal Pathology

Vine,Shrub, Bramble Fruit Crop

See Horticulture

Viral and Rickettsial Studies

Detection & Diagnosis

Isolation of Viruses

Multiplication & Replication

BIOLOGICAL CONTROL OF CRYPTOPHLEBIA LEUCOTRETA ... Disease -biocontrol; Fiber Crops; Granulosis Viruses; Olethreutidae; Polyhedrosis Viruses; Rearing of Insects; ... **4.0277**

BIOLOGICAL CONTROL OF HELIOTHIS ARMIGERA ... Disease -biocontrol; Fiber Crops; Isolation of Viruses; Noctuidae; Polyhedrosis Viruses; Rearing of Insects; ...**4.0278**

Serology

THE COCOA SWOLLEN SHOOT VIRUS DISEASE PROJECT ... Beverage Crops; Insecta; Pathology of Weeds; Population Dynamics; Swollen Shoot Virus; Virulence and Pathogenicity; ... **9.0129**

RINDERPEST PROPHYLAXIS - SEROLOGICAL SURVEILLANCE OF IMMUNITY ... Globulins; Immunology; Pseudomyxoviruses; Rinderpest; Veterinary Medicine; ...**11.0095**

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Pathology -mammal; Veterinary Medicine; ...**11.0099**

EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY ... Equine Encephalomyelitis; Etiology; Horses; Picornaviruses; Veterinary Entomology; ...**11.0100**

Viral Transmission

IDENTIFICATION OF A VIRUS DISEASE OF PANICUM MAXIMUM ... Panicum; Phytopathology; Plant Virus -general; Soil-borne; Vectors; ...**4.0074**

THE VIRUS DISEASES OF THE COTTON CROP IN WEST AND CENTRAL AFRICA ... Electron Microscopy; Mosaic Viruses; Phytopathology; Vectors; Virus Resistance; ...**4.0075**

IDENTIFICATION OF DISEASES OF FOOD CROPS - MANIOC (CASSAVA) AND YAMS ... Electron Microscopy; Manihot; Phytopathology; Vectors; ...**4.0076**

IDENTIFICATION OF VIRUSES OF MARKET GARDENING PLANTS IN THE IVORY COAST - GOMBO (OKRA), PASSION-FRUIT AND PEPPER ... Capsicum; Mosaic Viruses; Passiflora; Phytopathology; Plant Virus -general; Vectors; ... **4.0077**

VIRUS DISEASES OF SOYA BEAN ... Glycine Max; Phytopathology; Plant Virus -general; Virus Resistance; ...**9.0243**

Virulence and Pathogenicity

THE COCOA SWOLLEN SHOOT VIRUS DISEASE PROJECT ... Beverage Crops; Insecta; Pathology of Weeds; Population Dynamics; Swollen Shoot Virus; ...**9.0129**

Viral Transmission

See Viral and Rickettsial Studies

Viral Vaccines

See Vaccines

Virescence

See Plant Diseases

Virulence and Pathogenicity

See Phytopathology

See Viral and Rickettsial Studies

Virus Resistance

See Plant Resistance

Viruses of Insects

See Viruses, Animal

Viruses, Animal

DNA Viruses, Enveloped

Poxviruses

POX OF SMALL RUMINANTS - EPIDEMIOLOGICAL AND PROPHYLACTIC RESEARCH ... Epidemiology of Disease; Sheep Scab or Sheep Pox; Viral Vaccines; ...**11.0098**

AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT ... Fowl Pox; Immunity; Newcastle Disease; Salmonella; Veterinary Medicine; ...**11.0115**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE ... Fowl Cholera; Fowl Typhoid Pullorum Disease; Myxoviruses, True; Poultry -nonspecific; Salmonella; Veterinary Medicine; ... **11.0117**

RNA Viruses, Enveloped

Arboviruses

EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY ... Equine Encephalomyelitis; Etiology; Horses; Picornaviruses; Veterinary Entomology; ...**11.0100**

Myxoviruses, True

AVIAN DISEASES - MEDICAL PROPHYLAXIS - "TRIAVIA" COMBINED VACCINES - ESTABLISHMENT - IMPROVEMENT ... Fowl Pox; Immunity; Newcastle Disease; Salmonella; Veterinary Medicine; ...**11.0115**

AVIAN PATHOLOGY - MEDICAL PROPHYLAXIS - ESTABLISHMENT OF A QUADRIVALENT MIXED VACCINE ... Fowl Cholera; Fowl Typhoid Pullorum Disease; Poultry -nonspecific; Salmonella; Veterinary Medicine; ...**11.0117**

Pseudomyxoviruses

RINDERPEST PROPHYLAXIS - SEROLOGICAL SURVEILLANCE OF IMMUNITY ... Globulins; Immunology; Rinderpest; Serology; Veterinary Medicine; ...**11.0095**

RINDERPEST PROPHYLAXIS - ESTABLISHMENT OF A THERMO-RESISTANT VACCINE ... Immunity; Prophylaxis; Rinderpest; Veterinary Medicine; Viral Vaccines; ...**11.0096**

PULMONARY SYNDROME IN SMALL RUMINANTS - AETIOLOGICAL STUDY ... Bovidae; Etiology; Pleuropneumonia Group; Pulmonary Syndrome; Rinderpest; ...**11.0097**

RNA Viruses, Naked

Picornaviruses

EQUINE ENCEPHALOMYELITIS - AETIOLOGY, EPIDEMIOLOGY ... Equine Encephalomyelitis; Etiology; Horses; Veterinary Entomology; ...**11.0100**

Reoviruses

AFRICAN HORSE SICKNESS - EPIDEMIOLOGICAL WORK ... Epidemiology of Disease; Horses; Pathology -mammal; Serology; Veterinary Medicine; ...**11.0099**

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CONTROL OF ORYCTES IN THE IVORY COAST ... Entomology, Physiology; Insect Attractants; Population Dynamics; Pueraria; ...**4.0327**

Granulosis Viruses

INTEGRATED CONTROL OF CRYPTOPHLEBIA, BY ADDITION OF VIRUSES TO THE CHEMICAL INSECTICIDES ... Disease -biocontrol; Fiber Crops; Humid 6 M.or Less; Mode of Action; Peprothion; ...**1.0051**

BIOLOGICAL CONTROL OF CRYPTOPHLEBIA LEUCOTRETA ... Disease -biocontrol; Fiber Crops; Multiplication & Replication; Olethreutidae; Polyhedrosis Viruses; Rearing of Insects; ...**4.0277**

Insect Viruses -other

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MILL EFFLUENT STUDIES ... Odor & Taste; Waste Water Disposal; ...**9.0317**

Odor & Taste

MILL EFFLUENT STUDIES ... Food Processing Wastes; Waste Water Disposal; ...**9.0317**

Waste Water Disposal

MILL EFFLUENT STUDIES ... Food Processing Wastes; Odor & Taste; ...**9.0317**

Water

See Pest Control Measures

Physical Control

Water Application Methods

See Water Supply

Water Cycle

See Water Movement

Water Environment

See Environments, Animal

Water Environment -other

See Environments, Plant

Water Level Fluctuation

See Water Movement

Water Movement

Floods

AGRICULTURE RESEARCH IN DRAWDOWN AREAS ... Lakes & Reservoirs; Soil Types; ...**3.0237**

STUDY THE RATES OF FLOW OF THE DIFFERENT WATER-COURSES IN THE IVORY COAST ... Discharge; Flow Characteristics -water; Streams; ...**4.0042**

DATE OF SOWING IN RICE-FIELDS FOR SEMI-CONTROLLED SUBMERSION ... Ferric Luvisols; Humid 3 Months; Humid 4 Months; Management; Soil Moisture; Timing of Planting Procedures; ...**6.0007**

Groundwater Movement

SITE EVALUATION FOR PLANTATION DEVELOPMENT IN THE SAVANNA REGION ... Moisture Levels; Movement, Availability; Silviculture; Site Index and Site Quality; Soil Analysis -other; ...**9.0363**

Hydraulics

Discharge

STUDY THE RATES OF FLOW OF THE DIFFERENT WATER-COURSES IN THE IVORY COAST ... Floods; Flow Characteristics -water; Streams; ...**4.0042**

HYDROLOGICAL RATES OF FLOW, SOLIDS CARRIED BY AND CHEMISTRY OF THE WATERS OF THE SAN PEDRO, NERO, AND BRIME RIVERS ... Flow Characteristics -water; Gaging; Streams; Water Quality; ...**4.0043**

Flow Characteristics -water

STUDY THE RATES OF FLOW OF THE DIFFERENT WATER-COURSES IN THE IVORY COAST ... Discharge; Floods; Streams; ...**4.0042**

HYDROLOGICAL RATES OF FLOW, SOLIDS CARRIED BY AND CHEMISTRY OF THE WATERS OF THE SAN PEDRO, NERO, AND BRIME RIVERS ... Discharge; Gaging; Streams; Water Quality; ...**4.0043**

Infiltration

OPERATION OF RESEARCH IN GEODYNAMICS, GEOCHEMISTRY AND GEOMORPHOLOGY IN THE IVORY COAST ... Geology; Soil Crusts; Soil Morphology, Profiles; ...**4.0036**

STUDY OF RIVULET FORMATION, OF INFILTRATION AND OF THEIR CONDITIONAL FACTORS ON THE KORHOGO WATERSHED ... Rain; Rill Erosion; Soil Moisture; Soil Types; Watersheds; ...**4.0045**

STUDY OF SOIL - MOISTURE - PLANT RELATONSHIPS (WATER ECONOMY) ... Chromic Cambisols; Consumptive Use; Humidity; Irrigation; Luvic Arenosols; Soil-water-plant Relationships; ...**8.0009**

SOIL CHEMICAL AND PHYSICAL CHANGES UNDER CONTINUOUS CULTIVATION ... Management; Manihot; Sand; Trace Metals; ...**9.0048**

Leaching

Soil and Rock Leaching

POSSIBLE SECOND SEASON CASH CROP FOR FLUE CURED TOBACCO FARMERS ... Continuous Humid 7 Months,Plus; Fertilizer Losses; Management; Multiple Cropping; Production and Processing; Sorghum Vulgare (Grain); ...**3.0146**

BALANCE THE SUPPLIES OF MANURE ON CLAY SOILS ... Clay; Fertilizer Losses; Soil Analysis; Soil Column, Leaching Diff.; ...**4.0295**

SOIL IMPROVEMENT FOR REFORESTATION IN HIGH FOREST ZONE ... Elevational Levels, Altitude; Percolation; Soil Moisture; Soil Types; ...**9.0071**

LEACHING OF THE MINERAL ELEMENTS FROM SANDY SOILS CULTIVATED AS INTENSIVE SYSTEMS ... Fallowing; Fertilizer Losses; Luvic Arenosols; Sand; Soil Moisture; ...**11.0063**

Percolation

TO AVOID THE DEGRADATION OF SOILS BY CONTINUOUS CULTIVATION OF PINEAPPLES ... Bromeliaceae; Erosion Control; Management; Removal of Nutrients from Soil; Two Humid Seasons; ...**4.0148**

SOIL IMPROVEMENT FOR REFORESTATION IN HIGH FOREST ZONE ... Elevational Levels, Altitude; Soil and Rock Leaching; Soil Moisture; Soil Types; ...**9.0071**

Sediment Yield

STUDY OF REPRESENTATIVE WATERSHEDS IN THE FRAMEWORK OF MULTIDISCIPLINARY ACTIVITIES IN THE IVORY COAST ... Precipitation Gages; Water Runoff; Water Table; ...**4.0044**

Water Cycle

IRRIGATION SYSTEMS INVESTIGATION - HYDROLOGIC CHARACTERIZATION OF SMALL WATERSHEDS IN THE HUMID TROPICS ... Fertilizer Losses; Irrigation -general; Lysimeters; Subsurface Runoff; Watersheds; ...**9.0160**

Water Level Fluctuation

WATER MANAGEMENT EXPERIMENT IN LOWLAND RICE ... Evapotranspiration; Management; Moisture Levels; Plant Responses; ...**9.0006**

Water Runoff

STUDY OF REPRESENTATIVE WATERSHEDS IN THE FRAMEWORK OF MULTIDISCIPLINARY ACTIVITIES IN THE IVORY COAST ... Precipitation Gages; Sediment Yield; Water Table; ...**4.0044**

INDEX OF EROSION BY THE RAIN IN UPPER VOLTA ... Erosion Control; Rain; Rain Amount; Raindrop Impact; Weather Charts, Maps; ...**14.0004**

Agricultural Runoff

RIVER OBUBA-OPA WATERSHED PROJECT - RUN OFF AND EROSION STUDIES ... Erosion Control; Management Effects on Soils; Rain; Rain Amount; Raindrop Impact; Soil-water-plant Relationships; ...**9.0050**

STUDY OF RIVULET FORMATION AND OF EROSION ON VERTIC SOIL ... Eutric Regosols; Management Effects on Soils; Soil - Bare; Soil-water-plant Relationships; ...**14.0041**

Weeds

See Also Entomology, Applied

Agronomic Pests on

Control of Plants ...

Aquatic Plants

HYDROBIOLOGY RESEARCHES IN THE VOLTA BASIN ... Behavioral Ecology; Fish Food Supply; Plankton; Water Environment; ...**3.0236**

Forbs (Broadleaf Herbs)

CHEMICAL WEED CONTROL IN SUGARCANE ... Fenac; Grasses or Sedges; Pesticides -other; Saccharum; Sugar Crops; ... **3.0116**

PRE-PLANTING HERBICIDE TRIAL ON RICE ... Dalapon; Grass -nonspecific; Humid 6 Months; Planavin; ...**9.0004**

CHEMICAL WEED CONTROL IN PLANTATIONS, NURSERIES AND FIRE LANES ... Dalapon; Economics of Chemical Control; Grasses or Sedges; Nursery Observational Plots; Triazines -nonspecific; ...**9.0357**

AGRONOMIC STUDIES ON IRRIGATED, RAINFED LOWLAND AND UPLAND RICE ... Bentazon; D, 2,4-; Drought Resistance; Grass -nonspecific; Irrigation -general; Pesticides -other; Rain; ...**10.0001**

STUDY CHEMICAL WEEDING OF RICE GROWN IN THE RAINY SEASON ... Cereal Crops; Grasses or Sedges; Herbicides -nonspecific; Humid 4 Months; Interaction with Environment; ...**11.0153**

Grasses or Sedges

CHEMICAL WEED CONTROL IN SUGARCANE ... Fenac; Pesticides -other; Saccharum; Sugar Crops; ...**3.0116**

STUDY OF THE GERMINATIVE CAPACITY OF WEED SEEDS ... Continuous Humid; Germination; Grass -nonspecific; Physiology of Weeds; ...**4.0157**

CONTROL OF WEEDS ON IRRIGATED RICE-FIELDS, PARTICULARLY ISCHAEMUM RUGOSUM AND THE WILD SPECIES OF RICE PLANTS ... Humid 1 Month; Oryza -other; ...**6.0050**

ERADICATION OF PERENNIAL RICE SPECIES WITH RHIZOMES (O. LONGISTAMINATA) ... Cereal Crops; Cutting Sequence; Diuron; Management; Oryza -other; ...**6.0063**

STUDY OF THE DORMANCY OF THE WILD VARIETIES OF RICE, O. BREVILIGULATA AND O. LONGISTAMINATA ... Dormancy; Non-dry 3 Months, Plus; Physiology of Weeds; Soil Depth; ...**6.0064**

HERBICIDE EXPERIMENTS WITH COTTON ON ALLUVIALLY DISTRIBUTED SOILS ... Cyperus Rotundus; Grass -nonspecific; Herbicides -nonspecific; ...**8.0048**

PRE-PLANTING HERBICIDE TRIAL ON RICE ... Dalapon; Grass -nonspecific; Humid 6 Months; Planavin; ...**9.0004**

STUDIES ON THE HOST RANGE OF HELMINTHOSPORIUM ORYZAE ... Grass -nonspecific; Helminthosporium; Pathology of Weeds; ...**9.0278**

CHEMICAL WEED CONTROL IN PLANTATIONS, NURSERIES AND FIRE LANES ... Dalapon; Economics of Chemical Control; Forbs (Broadleaf Herbs); Nursery Observational Plots; Triazines -nonspecific; ...**9.0357**

AGRONOMIC STUDIES ON IRRIGATED, RAINFED LOWLAND AND UPLAND RICE ... Bentazon; D, 2,4-; Drought Resistance; Grass -nonspecific; Irrigation -general; Pesticides -other; Rain; ...**10.0001**

CONTROL CAMPAIGN AGAINST RHIZOME RICE ... Cereal Crops; Eutric Fluvisols; Eutric Gleysols; Herbicides -nonspecific; Hot Equatorial or Hot Tropical; ...**11.0150**

STUDY CHEMICAL WEEDING OF RICE GROWN IN THE RAINY SEASON ... Cereal Crops; Forbs (Broadleaf Herbs); Herbicides -nonspecific; Humid 4 Months; Interaction with Environment; ...**11.0153**

Trees & Shrubs

ELIMINATION OF UNWANTED LOW GRADE HARDWOOD TREES FROM FOREST STANDS AND PLANTATIONS ... Forests; Injection; Selectivity of Pesticides; Time & Motion Studies; ...**9.0358**

Control of Weeds in ...

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COFFEE AGRONOMY PROJECT ... Ethrel; Fruit-set or Fruit-thinning; Management; Mulches; Shade; Space Competition; ... **9.0145**

Cereal Crops

CONTROL OF WEEDS IN RICE ... Irrigation -general; Moisture Deficiency; Postemerge Application; Propanil; ...**3.0004**

WEED CONTROL OF UPLAND RICE ... CP 53619; Management; Timing -other; ...**3.0188**

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Irrigation -general; Management; Phenology, Life Cycle; Physical Control; Two Humid Seasons; ...**4.0093**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Irrigation -general; Propanil; Silvex; ...**4.0094**

MODIFICATIONS OF THE WEED FLORA DUE TO CHEMICAL HERBICIDE TREATMENTS ... Continuous Humid; Fiber Crops; Hand Tillage; Herbicides -nonspecific; Phenology, Life Cycle; Soil Tillage Sequence / Method; ...**4.0184**

WEEDING OF PLUVIAL RICE, COMBINING CULTIVATION TECHNIQUES AND CHEMICAL HERBICIDE TREATMENTS ... Herbicides -nonspecific; Management; Placement; ...**4.0185**

STUDY OF THE BIOLOGICAL CYCLES OF WEEDS ... Competition; Continuous Humid; Management; Phenology, Life Cycle; Soil Tillage Sequence / Method; ...**4.0188**

CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE ... D, 2,4-; Management; Propanil; Silvex; ...**4.0204**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Hand Tillage; Pricking Out; Selectivity of Pesticides; ... **4.0205**

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Continuous Humid; Cultural Control; Irrigation -general; Management; Phenology, Life Cycle; ...**4.0206**

CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE ... Hand Tillage; Management; Propanil; Silvex; ...**4.0208**

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Humid 5 Months; Irrigation -general; Management; Phenology, Life Cycle; Physical Control; ...**4.0209**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Humid 5 Months; Pricking Out; Selectivity of Pesticides; ... **4.0210**

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Cultural Control; Ferralic Cambisols; Irrigation -general; Management; Phenology, Life Cycle; Two Humid Seasons-7 Month,Plus; ...**4.0216**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Hand Tillage; Pricking Out; Selectivity of Pesticides; Two Humid Seasons-7 Month,Plus; ...**4.0217**

CHEMICAL WEED DESTRUCTION ON PLUVIAL RICE ... Hand Tillage; Pricking Out; Selectivity of Pesticides; ...**4.0219**

INVENTORY OF THE WEED FLORA OF PLUVIAL AND IRRIGATED RICE-FIELDS ... Continuous Humid 7 Months,-Plus; Cultural Control; Irrigation -general; Management; Phenology, Life Cycle; ...**4.0220**

CHEMICAL WEED DESTRUCTION ON IRRIGATED RICE ... Hand Tillage; Pricking Out; Selectivity of Pesticides; ... **4.0221**

STUDY OF WEEDS IN IRRIGATED RICE ... Economics of Chemical Control; Herbicides -nonspecific; Management; ... **5.0016**

CONTROL OF WEEDS ON IRRIGATED RICE-FIELDS, PARTICULARLY ISCHAEMUM RUGOSUM AND THE WILD SPECIES OF RICE PLANTS ... Grasses or Sedges; Humid 1 Month; Oryza -other; ...**6.0050**

ERADICATION OF PERENNIAL RICE SPECIES WITH RHIZOMES (O. LONGISTAMINATA) ... Cutting Sequence; Diuron; Grasses or Sedges; Management; Oryza -other; ...**6.0063**

MANAGEMENT PRACTICES OF TWO RECOMMENDED RICE VARIETIES ... Hand Tillage; Humid 6 Months; Insecticides -nonspecific; Management; ...**9.0003**

PRE-PLANTING HERBICIDE TRIAL ON RICE ... Dalapon; Grass -nonspecific; Humid 6 Months; Planavin; ...**9.0004**

POST-PLANTING HERBICIDE TRIAL FOR RICE ... Humid 6 Months; Marsh; Preemerge Application; Timing -other; ... **9.0008**

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Physiology & Pathology

Phytopathology & Botany

Plant Biochemistry

Plant Biology

Plant Breeding

Plant Nematology

Plant Pathology

Plant Physiology

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PART 2
RESEARCH INSTITUTIONS AND STATIONS

INTRODUCTION TO PART 2

Description of the Research Institutions and Stations.

The objective of this section, prepared by CARIS staff in FAO, is not to give a complete description of the Research Institutions or Stations but to allocate them about the environment, importance and administrative or technical dependance. These Institutions or Stations are assembled by countries, and in the country following their CARIS reference number. Institutions and Stations outside West Africa are given at the end of the Section.

Data on each station are given in the following order:

CARIS Reference number and name of the Institution or Station

Each Institution or Station has received a reference number composed of two parts. Ex.: DM.021

Two letters indicate the country. The following codes have been used:

DM (Dahomey), FR (France), GA (Gambia), GH (Ghana), IV (Ivory Coast), LI (Liberia), ML (Mali), MR (Mauritania), NG (Niger), NI (Nigeria), RP (Philippines), SG (Senegal), SL (Sierra Leone), TO (Togo), UN (United Nations specialized Agencies), UV (Upper Volta).

The three-figure number identifies the research institution or station in the country.

The CARIS reference number of the research projects is the number of the stations where research is carried out to which have been added four figures to identify the project in the station.

Thus, the project DM.021.0007 is the seventh project sent by the station DM.021 in Dahomey (DM).

In the first section of this directory a sequential accession number has been substituted for the CARIS Project reference number given after the name of the first investigator in the description of the project.

This CARIS number can be used to find the description of the research station where a research project is carried out.

Addresses

Postal and telegraphic address, telephone.

Location

Longitude, latitude and altitude in metres (1 foot = 0,30 metre; 1 metre = 3,30 feet).

Climate

At the outset, the intention was to describe climates in the form of condensed original data. Therefore data received from the stations were not equally detailed and without homogeneity. For these reasons, it has been thought better to use climatic indexes based on an existing world-wide classification.

Thus the different climates have been represented by a four-figure code from "Climates of the World and their Agricultural Potentialities" by J. Papadakis (1966).

Soils

Indications sent by the different stations were given in different classifications. For the sake of uniformity, they have been converted into two-letter symbols from the FAO/UNESCO classification used in the explanatory text of "Soil Map of the World, vol. 1" published by UNESCO (Paris).

Staff

Number of scientists and technicians. Official and secondary languages that can be used for correspondence.

Experimental fields

Areas are only those used for research. They are given in hectares (1 acre = 0,40 hectare; 1 hectare = 2.5 acres).

Specialized equipment

Not to encumber the directory with a listing of usual equipment, commonly found in nearly all laboratories and stations, as tractors, cultivation material, etc., the quoted equipment is the specialized one as specialized laboratories, computers, cultivars collection. etc.

Training facilities

Subjects, level and duration of the courses.

Library and Documentation

Publications

Financial support

The expenditures include the staff salaries. The amount has been changed into US$. The official quotation on 18 January 1973 is the basis of these evaluations, i.e.:
1 US$ = 263 Fr.CFA = 208 Dalasi = 128 Cedi = 0,325 £. Nigeria = 0,78 Leone = 1 Liberia $.

Field of activity

Parent organization

These organizations do not undertake direct research; they often play an important part in the definition of the goals and can profit from the research results. They can be owners of the Research Installations or Stations. They can provide working facilities in material or money to Institutions or Agencies in charge of research.

Executive Agencies

These agencies organize research in the framework of the programme that they have defined either themselves or after agreement with the parent organization. They divide the research and the working facilities between the scientists and the stations. They supervise the research and centralize the result which they generally publish on their own responsibility.

Climatic Codes

after "Climates of the World and their Agricultural Potentialities" — J. Papadakis, 1966.

1100 – HUMID SEMI-HOT EQUATORIAL (FOREST BELT)
Moderate maximum temperature (highest monthly average daily maximum of the warmest month below 33,5°C); annual rainfall greater than annual potential evapotranspiration.

1110 – Ever humid. All months are humid.

1120 – Humid. One or more months are non-humid but no month is dry.

1121 – The humid season is formed by a continuous series of months; rainfall surplus below 2000 mm.

1122 – There are 2 humid seasons; rainfall surplus below 2000 mm.

1123 – Rainfall surplus above 2000 mm.

1130 – Moist monsoon; 1 to 3 months are dry.

1131 – Seven or more humid months; rainfall surplus below 1000 mm; the humid season is formed by a continuous series of months.

1132 – Seven or more humid months; rainfall surplus above 1000 mm and below 2000 mm.

1133 – Seven or more humid months; rainfall surplus above 2000 mm.

1134 – Seven or more humid months; rainfall surplus below 1000 mm; there are 2 humid seasons.

1135 – Six or less humid months.

1300 – DRY SEMI-HOT TROPICAL (COASTAL SAVANNAH BELT)
Moderate maximum temperature (average daily maximum of the warmest month below 33,5°C; annual rainfall between 44 and 100% of annual potential evapotranspiration.

1310 – Dry monsoon; 4-5 dry months.

1320 – Dry monsoon; 6 or more dry months.

1350 – Moist monsoon; 0–3 dry months.

1400 – HOT TROPICAL
High maximum temperature (average daily maximum of the warmest month above 33,5°C); annual rainfall above 44% of annual potential evapotranspiration.

1410 – Dry monsoon; 4 or less dry months.

1411 – The humid season is formed by a continuous series of months.

1412 – Two humid seasons.

1420 – Dry monsoon; 5 or more dry months.
1460 – Moist monsoon; 4 or more dry months, annual rainfall is greater than annual potential evapotranspiration.
1470 – Moist monsoon; 3 or less dry months, annual rainfall is greater than annual potential evapotranspiration.
1471 – Rainfall surplus less than 1000 mm.
1476 – Rainfall surplus more than 1000 mm.
1480 – Moist monsoon; (Guinean Savannah). Annual rainfall between 44% and 100% of annual potential evapotranspiration.
1481 – 7 humid months.
1482 – 6 humid months.
1483 – 5 humid months.
1484 – 4 humid months.
1486 – Rainfall surplus above 1000 mm.

1500 – SEMI ARID TROPICAL
Annual rainfall less than 44% of annual potential evapotranspiration, but one or more months are non-dry.
1530 – Hot tropical, one or more months are humid (Sudanian or Northern Savannah Belt). High maximum temperature (average daily maximum of the warmest month above 33,5°C).
1532 – 3 humid months.
1533 – 2 humid months.
1534 – One humid month.
1540 – Same as 1530, but no month is humid (Sahelian Steppes).
1542 – 3 non-dry months.
1570 – Semi-hot tropical, 1 or more humid month. Average daily maximum of the warmest month below 33,5°C.
1573 – 2 humid months.
1580 – Same as 1570, but no month is humid.

1700 – HUMID TIERRA TEMPLADA
Cool nights (average daily minimum of all months below 20°C).
1730 – Moist monsoon; 4 or less dry months.
1740 – Same as 1730, but 5 or more dry months.
1741 – 5 dry months.

1900 – COOL WINTER HOT TROPICAL
1910 – Average daily maximum of the coldest month above 21°C; average daily minimum of the coldest month between 8 and 13°C.
1916 – 2 humid months.
1917 – One humid month.
1918 – No humid month; 3 or more non-dry months.
1919 – No humid month; 2 or less non-dry months.

3100 – HOT TROPICAL DESERT
Average daily maximum of the warmest month above 33,5°C. All months with average daily maximum above 15°C are dry.
3120 – Average daily minimum of the coldest month between 13 and 18°C.
3140 – Average daily minimum of the coldest month between 8 and 13°C.

SOIL CODES

from "Soil Map of the World, Vol. 1" published by UNESCO – Paris

A – ACRISOLS

AF – Ferric Acrisols
AG – Gleyoc Acrisols
AO – Orthic Acrisols
AP – Plinthic Acrisols

F – FERRASOLS

FA – Acric Ferrasols
FO – Orthic Ferrasols
FR – Rhodic Ferrasols
FX – Xanthic Ferrasols

G – GLEYSOLS

GD – Dystric Gleysols
GE – Eutric Gleysols
GH – Humic Gleysols

I – LITHOSOLS

J – FLUVISOLS

JC – Calcaric Fluvisols
JD – Dystric Fluvisols
JE – Eutric Fluvisols
JT – Thionic Fluvisols

L – LUVISOLS

LC – Chromic Luvisols
LF – Ferric Luvisols
LG – Gleyic Luvisols
LP – Plinthic Luvisols
LY – Vertic Luvisols

N – NITOSOLS

ND – Dystric Nicotols NH – Humic Nitosols
NE – Eutric Nitosols

Q – ARENOSOLS

QC – Cambic Arenosols QL – Luvic Arenosols
QF – Ferralic Arenosols

R – REGOSOLS

RC – Calcaric Regosols RE – Eutric Regosols
RD – Dystric Regosols

SO – ORTHIC SOLONETZ

V – VERTISOLS

VC – Chromic Vertisols VP – Pellic Vertisols

W – PLANOSOLS

WE – Eutric Planosols WS – Solodic Planosols

ZO – ORTHIC SOLONCHAKS

DAHOMEY (DM)

DM. 020 — AGENCE IRAT AU DAHOMEY

B.P. 422, Cotonou
Tel. Add.: IRATROP - COTONOU
Tel.: Cotonou 28-72.

This body is the representative in Dahomey of the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), 110 rue de l'Université, Paris VII^{e}, France (FR. 130)

Financial Support:
The detail of financial support is given for each centre or station.

Field of Activity:
Agronomy (Techniques of cultivation, fertilization and systems of cropping on maize, groundnuts, rice, sorghum, yams, vigna) - Varietal improvement (maize, sorghum) - Forage plants - Sugar cane - Conservation of harvests.

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère du Développement Rural et de la Coopération du Dahomey

DM. 021 — CENTRE IRAT DE COTONOU

BP. 422, Cotonou
Tel. Add.: IRATROP - COTONOU
Tel.: Cotonou 28-73

Staff: 1 scientist, 3 technicians - Language: French
Field of activity: see DM. 020
Attached to this centre are the following outstations, where the experimental work is carried out:

- OUTSTATION AT ANGARÉDÉBOU
  E. 03.00 - N. 11.19 - 240 m
  Climate: 1484 - Soils: LF
  Not irrigated crops: 4 Ha - (Financial support $15,200 - Bilateral)
- OUTSTATION AT SAVÉ
  E. 02.24 - N. 08.02 - 190 m
  Not irrigated crops: 5 Ha - (Financial support $15,200 - Bilateral)
- OUTSTATION AT BAGOU
  E. 02.44 - N. 10.49 - 300 m
  Climate: 1484 - Soils: GH-BG
  Not irrigated crops: 2 Ha - (Financial support $3,800 - Bilateral)
- OUTSTATION AT LOGOZOHÉ
  E. 02.05 - N. 07.52 - 220 m
  Climate: 1411 - Soils GH-JE
  Not irrigated crops: 2 Ha - (Financial support $3,800 - Bilateral)
- OUTSTATION AT ABOMEY
  E. 02.03 - N. 07.10 - 164 m
  Climate: 1412 - Soils: ND-QL
  Not irrigated crops: 4 Ha - (Financial support $9,500 - Bilateral)
- OUTSTATION AT HINVI
  E. 02.10 - N. 03.50 - 130 m
  Climate: 1412 - Soils: ND
  Not irrigated crops: 5 Ha - (Financial support $9,500 - Bilateral)
- OUTSTATION AT MÉRIDJONOU
  E. 02.40 - N. 06.30 - 20 m
  Climate: 1135 - Soils: ND
  Not irrigated crops: 8 Ha - (Financial support $9,500 - Bilateral)
- Total financial support = $66,500 - Bilateral

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence au Dahomey (DM. 020)

DM. 022 — SECTION DE RECHERCHES D'INA (IRAT)

Ina via N'Dali
BP. 155, Parakou
Tel.: Parakou 22-33

Location: E. 02.43 - N. 09.58 - 341 m
Climate: 1483 - Soils: LF
Staff: 1 scientist, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 30 Ha
Teaching and popularization:
Course intended for advisers in agriculture (1 month)
Publications:
Annual reports
Financial support: $45,600
Government of Dahomey ½
Bilateral . . . . . ½
Field of activity: see DM. 020

Includes the OUTSTATION AT ODURA:
Climate: 1483 - Soils: GH-LG-WE
Not irrigated crops: 4 Ha

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut de Recherches Agronomiques Tropicales des Cultures Vivrières (IRAT) - Agence au Dahomey (DM. 020)

DM. 023 — STATION DE RECHERCHES AGRONOMIQUES DE NIAOULI (IRAT)

Niaouli via Attogon
Tel. Add.: IRAT - ATTOGON
Tel.: Attogon 1

Location: E. 02.08 - N. 06.44 - 105 m
Climate: 1412 - Soils: ND

Staff: 1 scientist, 6 technicians - Language: French
Experimental fields:
Not irrigated crops 40 Ha - Pastures 10 Ha - Forest 170 Ha
Teaching and popularization:
Course intended for monitors in agriculture (1 month)
Library and documentation:
500 volumes - IRAT card indexing system
Publications:
Annual reports - Technical notes
Financial support: $95,000
Government of Dahomey ½
Bilateral . . . . . ½
Field of activity: see DM. 020

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence au Dahomey (DM. 020)

DM. 040—DIRECTION RÉGIONALE IRCT AU DAHOMEY

BP. 715, Cotonou
Tel.: Cotonou 34-46

This Regional Administration represents, in Dahomey, the Institut du Coton et des Textiles exotiques (IRCT), 34 rue des Renaudes, Paris XVIII[e], France (FR. 150)

The research work is carried out by five sectors and sections each having one scientist at its head:
- IRCT Sector of South Dahomey (DM. 042)
- IRCT Sector of Central Dahomey (DM. 043)
- IRCT Sector of North Dahomey (DM. 044)
- Hessian Fibres Section (DM. 045)
- Entomology Section (DM. 046)

Teaching and popularization:
The training of monitors and of extension officers is guaranteed at the IRCT Station at Sekou and in all the outstations.
Publications:
Report of the year's activities
Participation in "Coton et Fibres Tropicales," a review published by the IRCT (Paris)
Financial support:
The detail of the financial support is given for each sector and section.
Field of activity:
Research work on the production and the protection of plants used for textile fibres.

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères
Ministère du Développement Rural et de la Coopération au Dahomey

DM. 042 — SECTEUR IRCT — SUD-DAHOMEY

IRCT Station at Sekou
(Dpt de l'Atlantique) Dahomey
BP. 715, Cotonou

Staff: 1 scientist, 3 technicians - Language: French

The research work is carried out at the following stations and outstations:
IRCT STATION AT SEKOU (ATLANTIQUE)
E. 002.13 - N. 06.38 - 82 m
Climate: 1135 - Soils: ND
Not irrigated crops: 7.80 Ha
Financial support: $73,400
OUTSTATION at AGONVY - IKPILE (Dept. of Guémé)
E. 002.33 - N. 06.51 - 100 m
Climate: 1135 - Soils: ?
Not irrigated crops: 3.25 Ha
Financial support: $30,000
OUTSTATION AT APLAHOUE - BOZINKPE (Dept of Nono)
E. 001.41 - N. 06.58 - 201 m
Climate: 1412 - Soils: ND
Not irrigated crops: 3.30 Ha
Financial support: $31,000
Total financial support: $134,400
Government of Dahomey ¼
Bilateral . . . . . ¾

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Direction Régionale IRCT au Dahomey (DM. 040)

DM. 043 — SECTEUR IRCT — CENTRE-DAHOMEY

BP. 144, Abomey

Staff: 1 scientist, 5 technicians - Language: French

The research work is carried out on the following outstations, located in the department of Zou:
BOHICON OUTSTATION
E. 002.22 - N. 07.14 - 120 m
Climate: 1412 - Soils: ND
Not irrigated crops: 2.1 Ha
Financial Support: $5,600
GOBE OUTSTATION
E. 002.28 - N. 08.00 - 190 m
Climate: 1411 - Soils: WE
Not irrigated crops: 12.20 Ha
Financial support: $33,500
COVE OUTSTATION
E. 002.02 - N. 07.13 - 200 m
Climate: 1412 - Soils: ND
Not irrigated crops: 4.5 Ha
Financial support: $12,000
AGOUA OUTSTATION
E. 001.57 - N. 08.16 - 240 m
Climate: 1411 - Soils: LG-LP
Not irrigated crops: 1.10 Ha
Financial support: $2,900
SAVALOU OUTSTATION
E. 001.55 - N. 07.45 - 170 m
Climate: 1411 - Soils: LG-LP
Not irrigated crops: 5.70 Ha
Financial support: $15,300
Total financial support: $69,300
Government of Dahomey 90%
Bilateral 10%

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Direction Régionale IRCT au Dahomey (DM. 040)

DM. 044 — SECTEUR IRCT — NORD-DAHOMEY

BP. 172, Parakou

Staff: 1 scientist, 8 technicians - Language: French

The research work is carried out on the following outstations, located in the departments of Borgou and of Atakora:
ALAFIAROU OUTSTATION (Borgou)
E. 002.45 - N. 09.20 - 350 m
Climate: 1482 - Soils: LF
Not irrigated crops: 12 Ha
Financial support: $22,000

GOGONOU OUTSTATION (Borgou
E. 002.50 - N. 10.50 - 300 m
Climate: 1484 - Soils: ?
Not irrigated crops: 7 Ha
Financial support: $12,800

ANGAREDEBOU OUTSTATION (Borgou)
E. 033.00 - N. 11.20 - 250 m
Climate: 1484 - Soils: LF
Not irrigated crops: 8.5 Ha
Financial support: $15,600

ALFAKOARA OUTSTATION (Atakora)
E. 001.45 - N. 09.35 - 400 m
Climate: 1484 - Soils: LF
Not irrigated crops: 3.4 Ha
Financial support: $10,600

GOMPAROU OUTSTATION (Borgou)
E. 002.30 - N. 11.15 - 300 m
Climate: 1484 - Soils: BE
Not irrigated crops: 7 Ha
Financial support: $12,800

SINAWARANOU OUTSTATION (Atakora)
E. 002.00 - N. 10.15 - 400 m
Climate: 1484 - Soils: LF
Not irrigated crops: 3.3 Ha
Financial support: $10.300

DASSARI OUTSTATION (Atakora)
E. 001.10 - N. 10.50 - 200 m
Climate: 1420 - Soils: LF
Not irrigated crops: 3.4 Ha
Financial support: $7,000

Total financial support: Department of Borgou: $63,200
Government of Dahomey: 90%
Bilateral 10%
Department of Atakora: $27,900
Government of Dahomey: 100%

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Direction Régionale IRCT au Dahomey (DM. 040)

DM. 045 — SECTION FIBRES JUTIÈRES IRCT — DAHOMEY

IRCT Station at SEKOU (Dépt. de l'Atlantique - Dahomey)
BP. 715, Cotonou

Staff: 1 scientist, 3 technicians - Language: French

The research work is carried out in the following stations and outstations:

IRCT STATION AT SEKOU
E. 002.13 - N. 06.38 - 82 m
Climate: 1135 - Soils: ND
Equipment:
Centre for retting, washing and drying
Financial support: $10,150

LOKPARA OUTSTATION (Borgou)
E. 002.42 - N. 09.18 - 350 m
Climate: 1482 - Soils: LF
Equipment:
Centre for retting, washing and drying
Financial support: $33,800

MASSI OUTSTATION (Dept. of the Atlantic)
E. 002.15 - N. 06.00 - 22 m
Climate: ? - Soils: VP
Not irrigated crops: 4 Ha
Financial support: $13.520

Total financial support: $57,450
Government of Dahomey 100%

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Direction Régionale IRCT au Dahomey (DM. 040)

DM. 046 — SECTION ENTOMOLOGIE IRCT — DAHOMEY

IRCT Station at SEKOU (Dept. de l'Atlantique)
BP. 715, Cotonou
Staff: 1 scientist - Language: French
Equipment:
Laboratory of entomology in the course of being equipped.
Financial support:
Included in the figure given for the IRCT Sector South Dahomey (DM. 042)

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Direction Régionale IRCT au Dahomey (DM. 040)

DM. 061 — STATION PRINCIPALE IRHO DE POBÈ

Pobé
Tel. Add.: INSTHUIL - POBÈ
Tel.: Pobé 106

Location: E. 02.40 - N. 06.59 - 115 m
Climate: 1412 - Soils: ND-LF-BF-BG-LG-GE-GD
Staff: 5 research workers, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 450 Ha - Forest: 300 Ha
Teaching and popularization:
Course intended for extension officers: Production techniques (1 to 6 months)
Library and documentation:
200 volumes - Reviews of Agronomy
Publications:
Participation in "Oléagineux" published with the collaboration of the IRHO (Paris)
Financial support: $304,000
Government of Dahomey 22%
Bilateral 22%
Self-support 56%
Field of activity:
Oil palm: Genetics (selection)
Experimental work - Pedology - Phytopathology - Entomology - Physiology - Treatment (extraction of the oil)

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut de Recherches pour les Huiles et Oléanigeux (IRHO) Paris (FR. 160)

DM. 062 — STATION IRHO DE SEME-PODJI

Seme-Podji via Porto-Novo
Tel. Add.: INSTHUIL - SEME-PODJI

Location: E. 02.38 - N. 06.22 - 4 m
Climate: 1135 - Soils: ND
Staff: 1 scientist - Language: French
Experimental fields:
Not irrigated crops: 192 Ha - Irrigated crops: 50 Ha
Teaching and popularization:
Specialization course on the cultivation of the cacao-tree for leaders of agricultural work - Baccalaureat [= Matriculation] level (3 weeks) - Introductory course on the

cultivation of the cacao-tree for students from the centres for rural training - BEPC level (3 weeks) - Various refresher courses on special request (variable duration)

Library and documentation:
Special Reviews

Publications:
Annual reports of activities - Technical reports - Participation in " Oléagineux " published with the collaboration of the IRHO (Paris)

Financial support: $71,200
Government of Dahomey 42%
Bilateral 42%
Self-support 16%

Field of activity:
Cacao-tree: Genetics (selection) - Experimental work - Pedology - Ecology - Phytopathology - Entomology

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO) Paris (FR. 160)

DM. 100 — SERVICE DES PÊCHES

BP. 383, Cotonou
Tel.: Cotonou 25-51

Par. Org.: Ministère du Développement Rural et de la Coopération (Dahomey)

DM. 101 — LABORATOIRE DES PÊCHES

BP. 383, Cotonou
Tel.: Cotonou 25-51

Location: E. 02.20 - N. 06.20 - 0 m
Climate: 1135
Staff: 1 scientist, 4 technicians - Language: French
Financial support: $22,800
Government of Dahomey 100%
Field of activity:
Physical and biological oceanography - Technological studies on the fishes of the sea, lagoons and rivers - Systematic classification of the West African species of fishes.

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Service des Pêches (DM. 100)

DM. 140 — MISSION IFAC AU DAHOMEY

BP. 89 Abomey
Tel.: Abomey 98

This mission is the representative in Dahomey of the Institut Français des Recherches Fruitières Outre-Mer (IFAC), 6 rue du Général Clergérie, Paris XVI^{e}, France (FR. 170)

Field of Activity:
Cultivation of fruit-trees (biochemistry, physiology, production, protection, entomology, phytopathology, improvement of varieties, technology).

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère du Développement Rural et de la Coopération du Dahomey

DM. 141 — STATION IFAC D'ALLAHE

BP. 89, Abomey
Tel.: 98, Abomey

Location: E. 02.17 - N. 07.08 - 110 m
Climate: 1412 - Soils: ND
Staff: 1 scientist, 2 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 15 Ha - Irrigated crops: 5 Ha
Special Equipment:
Collection of cultivars of synsepalum, avocado trees, citrus trees
Teaching and popularization:
Practical fruit-tree cultivation (1 month) -
Nursery techniques (1 month)
Library and documentation:
150 volumes - analytical documentation of the IFAC
Publications:
Participation in " Fruits " published by IFAC
Participation in " Développement Rural et Progrès " published by the Service de l'Agriculture
Financial support: $38,000
Government of Dahomey 1/10
Bilateral 9/10
Field of activity: see DM. 140

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut Français des Recherches Fruitières Outre-Mer (IFAC) - Mission au Dahomey (DM. 140)

DM. 142 — STATION IFAC DE TOUE

BP. 29 Abomey
Tel.: Abomey 98

Location: E. 02.20 - N. 07.12 - 150 m
Climate: 1412 - Soils: ND
Staff: 1 scientist, 2 technicians - Language: French (Occ. English)
Experimental fields:
Not irrigated crops: 15 Ha - Irrigated crops: 5 Ha
Special Equipment:
Collection of cultivars (citrus trees, mango trees - guava trees)
Teaching and popularization:
Practical fruit-tree cultivation (1 month) - Nursery techniques (1 month)
Library and documentation:
150 volumes - analytical documentation of the IFAC
Publications:
Participation in " Fruits " published by IFAC
Participation in " Développement Rural et Progrès " published by the Service de l'Agriculture
Financial support: $38,000
Government of Dahomey 1/10
Bilateral 9/10
Field of activity: see DM. 140

Par. Org.: Ministère du Développement Rural et de la Coopération du Dahomey

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) - Mission au Dahomey (DM. 140)

GAMBIA (GA)

GA. 020 — DEPARTMENT OF AGRICULTURE (MINISTRY OF AGRICULTURE AND NATURAL RESOURCES)

Headquarters, Cape St. Mary
Tel.: Cape 620

Par. Org.: Ministry of Agriculture and Natural Resources of Gambia

GA. 024 — YUNDUM EXPERIMENTAL STATION

P.O. Box Bathurst
Tel. Add. Agric. Yundum
Tel. Yundum 735

Location: W. 16.40 - N. 13.21 - 25.80 m
Climate: 1486 - Soils: ?
Staff: 4 scientists, 7 technicians - Language: English
Experimental fields:
Non-irrigated crops: 10 Ha - Irrigated Crops: 2 Ha
Specialized equipment:
A small collection mainly of groundnut, rice, sorghum and millet varieties.
Training facilities:
Pre-certificate level training in general agriculture (44 weeks)
Full two-years certificate training is expected to start in 1974
Refresher courses of varying duration for extension workers.
Library and Documentation:
About 100 volumes - 25 journals
Publications:
Annual reports
Financial support: $23,500
Government of the Gambia 100%
Field of activity:
Soil management (soil chemistry, erosion control, rotational trials, fertilizer trials) - Crop production (groundnuts, maize, sorghum, sesame, upland rice, cotton) - Crop protection - Animal husbandry (cattle) - Agricultural chemistry (groundnuts, lime processing).

Par. Org.: Ministry of Agriculture and Natural Resources (Gambia)

Exec. Ag.: Department of Agriculture

GHANA (GH)

GH. 020 — ANIMAL RESEARCH INSTITUTE OF GHANA

P.O. Box 20, Achimota
Tel. Add.: ANIMRES - ACHIMOTA
Tel.: 776-31 and 776-32

Location: W. 00.01 - N. 05.11 - 610 m
Climate: 1310
Staff: 10 scientists, 4 technicians - Language: English
Experimental fields:
Pastures: 85 Ha
Training facilities:
Junior technician's course: laboratory technology - animal health - parasitology - animal science - breeding and genetics - tropical grassland husbandry - introduction course in farm management (1 year)
Library and documentation:
1,500 books - Subject indexes
Publications:
Annual reports
Financial support: $363,000
Government of Gambia 100%
Field of activity:
Crop production (forage, grasses, legumes) - Animal production and animal products (animal breeding, genetics, physiology) - Animal health (pathology, parasitology)

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

GH. 040 — COCOA RESEARCH INSTITUTE OF GHANA

P.O. Box 8, Tafo - Akim

Location: W. 00.03 - N. 06.00 - 200 m
Climate: 1121 - Soils: ?
Staff: 17 scientists, 100 technicians - Language: English
Experimental fields:
Non-irrigated crops: 400 Ha - Forest: 50 Ha
Specialized equipment:
Cocoa insect collection - Cocoa cultivar collection - Biochemical laboratory (ultra-centrifuge) - Computer facilities
Publications:
Participation in " Bull. ento. Res." - "Agron. G." - "Ann. app. Biol." - " Ghana Int. Agric. Sci." - Annual report of the Institute.
Field of activity:
Agronomy - Plant breeding - Entomology - Plant pathology - Soil science and chemistry - Plant physiology

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

GH. 060 — CROPS RESEARCH INSTITUTE OF GHANA

P.O. Box 3785, Kumasi
Tel. Add.: CROPSEARCH - KUMASI

Library and documentation:
1,600 books - 200 titles of periodicals - Author and Subject indexes - Sheaf catalogues - Reprographic equipment
Publications:
Crops Research Institute Annual Reports - Bulletins and Farming guides - Participation in " Ghana Journal of Agricultural Science " issued by the CSIR and the Faculties of Agriculture of the Universities
Financial support (for the Institute and all attached stations): $224,500
Government of Ghana 100%
Field of activity:
General chemistry - Organic chemistry - Biochemistry - Genetics - Plant physiology - Botany - Zoology - Ecology -

Soil management - Plant breeding (maize, rice, cassava, sorghum, millet, groundnut, tomatoes, garden eggs, pepper, okroes) - Plant introduction and exploration (local and exotic) - Special crop investigations (oil palm, tobacco, cotton) - Crop protection - Entomology (insect predators of maize, sorghum, millet, yam, kenaf) - Plant pathology (investigations on seed dressings, coconut investigations, disease survey) - Food storage (maize, yam, cassava, dried fish, grains, beans) - Farm management (rotation trials, high yield demonstration, testing performance of imported vegetable seeds) - Agricultural statistics.

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

GH. 061 — KWADASO AGRICULTURAL EXPERIMENTAL STATION

P.O. Box 3785, Kumasi
Tel. Add.: CROPSEARCH - KUMASI
Tel.: Kumasi 6221-2

Location: W. 01.41 - N. 06.41 - 265 m
Climate: 1131 - Soils: ?
Staff: 22 scientists, 11 technicians - Language: English
Experimental fields:
Non-irrigated crops: 60 Ha
The Station includes: Horticulture section - Entomology section - Plant breeding/Agronomy section - Plant pathology section - Agricultural statistics section - Plant physiology section
Library and documentation, publications, financial support and field of activity: see GH. 060

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 062 — AIYINASI AGRICULTURAL EXPERIMENTAL STATION

P.O. Box 10, Aiyinasi, Nzima
Tel. Add.: CROPTECH - AIYINASI
Tel.: Aiyinasi 15

Location: W. 02.28 - N. 05.03 - 0 m
Climate: 1121 - Soils: ?
Staff: 2 technicians - Language: English
Experimental fields:
Non-irrigated crops: 90 Ha

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana

GH. 063 — PLANT INTRODUCTION AND EXPLORATION SECTION BUNSO-BUSUSO

PPB: Bunso - Busoso
Tel. Add.: CROPTECH - BUNSO
Tel.: Bunso 2

Location: W. 00.28 - N. 06.17 - 225 m
Climate: 1131 - Soils: ?
Staff: 1 technician - Language: English
Experimental fields:
Non-irrigated crops: 21 Ha

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 064 — NYANKPALA AGRICULTURAL EXPERIMENTAL STATION

P.O. Box 54, Nyankpala, via Tamale
Tel. Add.: CROPTECH - TAMALE
Tel.: Tamale 2411

Location: W. 00.58 - N. 09.25 - 280 m
Climate: 1420 - Soils: ?
Staff: 3 scientists, 3 technicians - Language: English
Experimental fields:
Non-irrigated crops: 24 Ha

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 065 — OHAWU AGRICULTURAL EXPERIMENTAL STATION

PPB. Ohawu
Tel. Add.: CROPTECH - OHAWU
Tel.: Abor 4

Location: E. 00.54 - N. 06.08 - 15 m
Climate: 1350 - Soils: NE
Staff: 1 scientist - Language: English
Experimental fields:
Non-irrigated crops: 48 Ha - Irrigated crops: 5 Ha

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 066 — MANGA SUBSTATION

Manga

Location: W. 00.16 - N. 11.01
Climate: 1420 - Soils: ?

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 067 — KPONG AGRICULTURAL IRRIGATION STATION

Kpong

Location: E. 00.04 - N. 06.08
Climate: 1134 - Soils: VP

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 068 — KUSI OIL PALM RESEARCH CENTRE

P.O. Box 74, Kade
Tel. Add.: CROPTECH - KADE

Location: W. 00.50 - N. 06.05 - 135 m
Climate: 1131 - Soils: ?
Staff: 4 scientists, 2 technicians - Language: English
Experimental fields:
Non-irrigated crops: 167 Ha

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 069 — POKOASE FOOD STORAGE SECTION

PMB, Pokoase
Tel. Add.: CROPTECH - POKOASE

Location: W. 00.16 - N. 05.40 - 50 m
Climate: 1310 - Soils: ?
Staff: 1 scientist, 2 technicians - Language: English
Experimental fields:
Non-irrigated crops: 12 Ha

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 071 — ASUANSI STATION

P.O. Box Asuansi

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 072 — EJURA FIELD STATION

P.O. Box Ejura

Location: W. 01.20 - N. 07.25
Climate: 1481 - Soils: ?

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 073 — KETA SUBSTATION

P.O. Box Keta

Location: E. 01.00 - N. 06.00
Climate: 1350 - Soils: ?

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

Exec. Ag.: Crops Research Institute of Ghana (GH. 060)

GH. 080 — FOOD RESEARCH INSTITUTE

P.O. Box 20, Accra
Tel. Add.: FOODSEARCH - ACCRA
Tel.: Accra 773-30

Staff: 25 scientists, 36 technicians
Library and documentation:
3,000 volumes, 200 periodicals
Field of activity:
Nutrition (food habits) - Food technology (analysis, preservation, processing and storage of fish, meat, cereals, fruits and vegetables, refrigeration, packaging) - Food microbiology - Food marketing - Food chemistry

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

GH. 100 — FOREST PRODUCTS RESEARCH INSTITUTE

P.O. Box 63, Kumasi
Tel. Add.: FORSEARCH - Kumasi
Tel.: Kumasi 3201 ext 400

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

GH. 160 — SOIL RESEARCH INSTITUTE OF GHANA

Academy post-office, Kwadaso-Kumasi
Tel. Add.: CHIEFSOIL - KUMASI
Tel.: Kumasi 2353 and 2354

Location:
W. 01.40 - N. 06.40 - 835 m
Climate: 1131
Staff: 14 scientists, 90 technicians - Language: English
Specialized equipment:
Soil Survey, Genesis and Classification Division: Stereoscopes, aerosketchmaster - Soil Chemistry and Mineralogy and Soil Fertility Divisions: Radiation monitor (Burndept) - Radiation survey meter (Type EMB 3) - Electronic counter - Electronic timer - High voltage supply/amplifier - Ratemeter (electronic) - Atomic absorption spectrophotometer 305 - Spectronic 20 - Philips X-ray set - "Spekker" - Cambridge Bench pH meter - Electric ovens - Electric furnace - Metler balances - Vacuum pumps.
Soils Physics Division: Pressure membrane apparatus
Library and documentation:
11,000 volumes - Reprographic equipment - U.D.C. Card Catalogue - Microfilm
Publications:
Annual Reports - Memoirs - Technical Reports - Bulletins - Divisional Papers - Occasional Papers.
Financial Support: $394,000
Government of Ghana 100%
Field of activity:
Pedology (soil analysis - classification - genesis - mapping) - Soil management (fertility - fertilizers)

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)

GH. 210 — DIVISION OF VETERINARY SERVICES (MINISTRY OF AGRICULTURE)

P.O. Box M 161, Accra

Field of activity:
Animal health. This division supervises work in two laboratories, in Accra (GH. 211) and Tamale (GH. 212)

Par. Org.: Ministry of Agriculture of Ghana

GH. 211 — ACCRA VETERINARY LABORATORY

P.O. Box M 161, Accra
Tel. Add.: PATHVET - ACCRA
Tel.: 758-23

Location: W. 00.10 - N. 05.36 - 0 m
Climate: 1310
Staff: 1 scientist, 11 technicians - Language: English
Specialized equipment:
Fluorescent antibody microscope
Training facilities:
Laboratory assistants and lab technicians (3 years)
Library and documentation:
150 volumes - 58 veterinary and agricult. periodicals
Publications:
Occasional papers in the "GHANA Journal of Science"
Field of activity:
Diagnosis of livestock diseases (poultry in particular)

Par. Org.: Ministry of Agriculture (Ghana)

Exec. Ag.: Division of Veterinary Services (GH. 210)

GH. 212 — TAMALE VETERINARY LABORATORY

P.O. Box 97, Tamale
Tel. Add.: PATHVET - TAMALE
Tel.: 071-2832

Location: W. 00.52 - N. 09.42 - 180 m
Climate: 1420
Staff: 2 scientists, 16 technicians - Language: English
Specialized equipment:
Vaccine freeze drying machines
Training facilites:
Laboratory assistants and technicians (3 years)
Library and documentation:
100 volumes - 40 veterinary and agricult. periodicals.
Publications:
Occasional papers in the "GHANA Journal of Science"
Field of activity:
Diagnosis of livestock disease - care of livestock

Par. Org.: Ministry of Agriculture (Ghana)

Exec. Ag.: Division of Veterinary Services (GH. 210)

GH. 320 — FACULTY OF AGRICULTURE (UNIVERSITY OF GHANA)

P.O. Box 68, Legon, Accra
Tel. Add.: UNIVERSITY LEGON
Tel.: Accra 753-81

Training facilities:

B.Sc. (Hons) Agric. Animal Sci.	(100 weeks)
M.Sc. Agric. Animal Science	(62 weeks)
National Diploma in Agric.	(50 weeks)
National Diploma in Animal Health	(50 weeks)

Library and documentation:
Balme Library (University) 260,000 volumes
Faculty Library 5,000 volumes
Publications:
Occasional articles published in "GHANA Journal of Science," "GHANA Journal of Agriculture Science," "GHANA Farmer"

Par. Org.: Ministry of Education - University of Ghana

GH. 322 — DEPARTMENT OF ANIMAL SCIENCE (FACULTY OF AGRICULTURE)

P.O. Box 68 Legon, Accra

Location: W. 00.10 - N. 05.36 - 0 m
Climate: 1310
Staff: 10 scientists, 5 technicians - Language: English
Specialized equipment:
Freeze-Dryer
Publications:
Participation in "Journal of Animal Science," "Bulletin of Epizootic Diseases of Africa," "Ghana Medical Journal," "Veterinary Record"
Financial support: $54,290
Government of Ghana 100%
Field of activity:
Cross breeding - Management of poultry - Nutritional requirements - Nutrition - Foot, mouth and skin diseases - Grassland and forage production and storage.

Par. Org.: University of Ghana

Exec. Ag.: Faculty of Agriculture (GH. 320)

GH. 324 — AGRICULTURAL RESEARCH STATION KPONG

P.O. Box 9, Kpong
Tel. Add.: UNIVERSITY KPONG
Tel.: Kpong 3

Location: E. 00.04 - N. 06.07 - 24 m
Climate: 1134 - Soils: VP
Staff: 4 scientists, 6 technicians - Language: English (second French)
Experimental fields:
Irrigated crops: 80 Ha - Pastures: 60 Ha - Forest: 24 Ha
Specialized equipment:
Sprinkler irrigation (and gravity irrigation), tractors and implements, rice combine-harvester, rice mill, experimental cotton gin.
Training facilities:
Training in irrigation and mechanized agriculture is planned to start in 1973
Library and documentation:
Scientific Journals
Publications:
Annual reports - Publications in the GHANA Journal Agric. Sci., the GHANA Journal of Sci., the GHANA Farmer.
Financial support: $108,000
Government of Ghana 100%
Field of activity:
Soil management - Crop production (rice, sugar cane, cotton) - Crop rotation - Fertilizer - Irrigation - Variety trials - Animal health - Grazing trials - Pasture lands

Par. Org.: Ministry of Education, University of Ghana

Exec. Ag.: Faculty of Agriculture (GH. 320)

GH. 326 — AGRICULTURAL RESEARCH STATION NUNGUA

P.O. Box 38, Legon, Accra

Location: W. 00.05 - N. 05.40 - 300 m
Climate: 1310 - Soils: ?
Staff: 1 scientist, 1 technician - Language: English
Experimental fields:
Pastures: 1,600 Ha - Ponds for pisciculture: 10 Ha
Training facilities:
Livestock management: training of potential farmers through doing the actual work (1-6 months)
Publications:
Annual reports - Participation in GHANA Journal Sci., GHANA Farmer, J. West Afr. Sci. Assoc.
Financial support: $160,000
Government of Ghana 80%
Private 20%
Field of activity:
Animal production and animal products (breeding and cross-breeding) - Nutrition - Animal health (trypanosomiasis, haematological changes, postmortem findings) - Agrostology.

Par. Org.: Ministry of Education - University of Ghana

Exec. Ag.: Faculty of Agriculture (GH. 320)

GH. 340 — FACULTY OF SCIENCE (UNIVERSITY OF GHANA)

P.O. Box 71, Legon, Accra

Par. Org.: Ministry of Education, University of Ghana

GH. 342 — DEPARTMENT OF BOTANY (FACULTY OF SCIENCE)

P.O. Box 71, Legon, Accra
Field of activity:
Ecology (marine algae, aquatic weeds, rain forest) - Genetics - Biometry - Taxonomy (algae, flowering plants) - Plant physiology (growth and flowering of forest trees, yam metabolism, drought resistance, fungal space germination)

Par. Org.: Ministry of Education, University of Ghana

Exec. Ag.: Faculty of Science (GH. 340)

GH. 343 — DEPARTMENT OF ZOOLOGY (FACULTY OF SCIENCE)

P.O. Box 71, Legon, Accra

Field of activity:
Taxonomy - Genetics - Neurophysiology - Helminthology - Entomology - Herpetology - Parasitology - Marine and freshwater biology - Ecology (Sub-littoral, forest) - Animal behaviour - Ethology - Animal populations

Par. Org.: Ministry of Education, University of Ghana

Exec. Ag.: Faculty of Science (GH. 340)

GH. 350 — VOLTA BASIN RESEARCH PROJECT

University of Ghana
Legon, Accra

Staff: 6 scientists, 11 technicians - Language: English
Library and documentation:
Special collection in the Balme Library (University of Ghana)
Publications:
Occasional papers in "GHANA Journal of Science," "Hydrobiologia" - "W. Afr. Archol. Newsletter" J.W.
Financial support: $57,720
Government of Ghana 100 %
Field of activity:
Animal ecology (insects, fish) - Plant ecology - Hydrobiology (physicochemical analysis of water, phytoplankton and zooplankton enumeration, fish population, food of fishes, effects of herbicides and molluscicides on invertebrate fauna)
Includes:
Biology project: Depts of Botany and Zoology, University of Ghana, Volta lake research project, Akosombo
Draw-down area agricultural project: Faculty of Agriculture, Legon
Sociology project: Dept. of Sociology, Legon

Par. Org.: University of Ghana

GH. 410 — BUILDING AND ROAD RESEARCH INSTITUTE

University of Science and Technology
University P.O. Box 40, Kumasi

GH. 411 — TERMITE DIVISION

University P.O. Box 40, Kumasi

Par. Org.: Ministry of Education, University of Science and Technology

Exec. Ag.: Building and Road Research Institute (GH. 410)

GH. 831 — RADIOISOTOPE LABORATORY OF THE SOIL RESEARCH INSTITUTE

Academy Post Office, Kwadaso, Kumasi

Location: W. 01.40 - N. 06.40 - 835 m
Staff: 2 scientists, 7 technicians - Language: English
Financial support: $7,500
Government of Ghana 65%
Bilateral 35%
Field of activity:
Use of isotopes in agricultural research

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)
International Atomic Energy Agency

Exec. Ag.: Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, Vienna (UN. 118)
Soil Research Institute of Ghana (GH. 160)

GH. 832 — RADIOISOTOPE LABORATORY OF THE COCOA RESEARCH INSTITUTE OF GHANA

P.O. Box 8, Tafo, Akim

Location: W. 00.03 - N. 06.00 - 200 m
Staff: 3 scientists, 6 technicians - Language: English
Financial support: $ 6,000
Government of Ghana 60%
Bilateral 40%
Field of activity:
Use of isotopes in agricultural research

Par. Org.: Council for Scientific and Industrial Research - CSIR (Ghana)
International Atomic Energy Agency

Exec. Ag.: Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, Vienna (UN. 118)
Cocoa Research Institute of Ghana (GH. 040)

IVORY COAST (IV)
(CÔTE-D'IVOIRE)

IV. 020 — AGENCE IRAT EN CÔTE-D'IVOIRE

BP. 635, Bouaké
Tel. Add.: IRATROP - BOUAKE

This body is the representative in the Ivory Coast of the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), 110 rue de l'Université, Paris VII[e], France (FR. 130)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de la Recherche Scientifique de Côte-d'Ivoire

IV. 021 — STATION IRAT DE BOUAKÉ

BP. 635, Bouaké
Tel. Add.: IRATROP - BOUAKÉ
Tel.: Bouaké 21-69

Location: W. 05.05 - N. 07.40 - 365 m
Climate: 1411 - Soils: AP-AF-AG-BF-GH-FR
Staff: 13 scientists, 5 technicians - Language: French
Experimental fields:
Not irrigated crops: 30 Ha - Irrigated crops: 10 Ha
Special Equipment:
Range of apparatus for auto-analysis - spectrophotometer - 2 neutron humiditimeters
Library and documentation:
1,760 volumes or brochures - 120 reviews
Publications:
Participation in " Agronomie Tropicale " published by the IRAT (Paris)
Financial support: $557,000
Government of the Ivory Coast 46%
Bilateral 46%
Self-support 8%
Field of activity:
Pedology - Plant improvement (rice, maize, yams) - Techniques for cultivation (chemical weed control) - Irrigation

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence en Côte-d'Ivoire (IV. 020)

IV. 022 — STATION IRAT DE GAGNOA

BP. 602, Gagnoa

Location: W. 06.55 - N. 06.05 - 210 m
Climate: 1134 - Soils: BF
Staff: 1 technician - Language: French
Experimental fields:
Not irrigated crops: 3 Ha - Irrigated crops: 5 Ha
Financial support: $66,900
Government of the Ivory Coast 47.5%
Bilateral 47.5%
Self-support 5%
Field of activity:
Pedology - Cultivation techniques (chemical weed control)

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence en Côte-d'Ivoire (IV. 020)

IV. 023 — STATION IRAT DE MAN

BP. 440, Man

Location: W. 07.20 - N. 07.25 - 320 m
Climate: 1132 - Soils: ?
Staff: 1 technician - Language: French
Experimental fields:
Not irrigated crops: 7 Ha - Irrigated crops: 0.5 Ha
Financial support: $37,000
Government of the Ivory Coast 47.5%
Bilateral 47.5%
Self-support 5%
Field of activity:
Cultivation techniques (chemical weed control)

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence en Côte-d'Ivoire (IV. 020)

IV. 024 — FERME DES CULTURES IRRIGUÉES DE TOMBORKO (IRAT)

BP. 12, Yamoussoukno

Location: W. 05.30 - N. 06.56 - 210 m
Climate: 1412 - Soils: ?
Staff: 1 scientist, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 8 Ha - Irrigated crops: 22 Ha
Special Equipment:
2 neutron humiditimeters
Financial support: $127,400
Government of the Ivory Coast 97.5%
Self-support 2.5%
Field of activity:
Irrigation - Pedology - Rice cultivation

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence en Côte-d'Ivoire (IV. 020)

IV. 025 — STATION IRAT DE FERKÉSSÉDOUGOU

BP. 121, Ferkessedougou

Location: W. 05.15 - N. 09.30 - 320 m
Climate: 1483 - Soils: ?
Staff: 1 technician - Language: French
Experimental fields:
Not irrigated crops: 10 Ha
Irrigated crops: 5 Ha
Financial support: $68,400
Government of the Ivory Coast 43.5%
Bilateral 43.5%
Self-support 13%
Field of activity:
Pedology - Cultivation techniques (chemical weed control)

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence en Côte-d'Ivoire (IV. 020)

IV. 040 — CENTRE CTFT EN CÔTE-D'IVOIRE

BP. 8033, Abidjan
Tel. Add.: CETEFO - ABIDJAN
Tel.: 34-98-58

This body is the representative in the Ivory Coast of the Centre Technique Forestier Tropical (CTFT), Avenue de la Belle Gabrielle 93, Nogent-sur-Marne, France (FR. 110)

The research work is carried out by the Divisions of Technology, Phytopathology and Forest Improvement at Abidjan (IV. 041) and also by the Silviculture Stations at Bouaké (IV. 042) and at San Pedro (IV. 043) and the Pisciculture station at Bouaké (IV. 044)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France) Ministère de la Recherche Scientifique de Côte-d'Ivoire

IV. 041 — DIVISIONS CTFT D'ABIDJAN

BP 8033, Abidjan
Tel. Add.: CETEFO - ABIDJAN
Tel.: 34-98-58

Location: W. 04.00 - N. 05.20 - 50 m
Climate: 1122 - Soils: QF
Staff: 4 scientists, 1 technician - Language: French
Experimental field
Forest 100 Ha
Library and documentation:
3,000 volumes - Oxford card system of classification
Publications:
Participation in " Bois et Forêts des Tropiques " published by the CTFT (Paris)
Financial support: $114,000
Government of the Ivory Coast 50%
Bilateral 50%
Field of activity:
Three divisions: Technology - Phytopathology - Forest Improvement

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre en Côte-d'Ivoire (IV. 040)

IV. 042 — STATION SYLVICOLE DE BOUAKÉ (CTFT)

BP. 695, Bouaké
Tel. Add.: CETEFO - BOUAKE
Tel.: 63-21-70

Location: W. 05.05 - 07.50 - 290 m
Climate: 1411 - Soils: AP
Staff: 1 scientist, 2 technicians - Language: French
Experimental fields:
Forest 300 Ha
Library and documentation:
300 volumes
Financial support: $64,600
Government of the Ivory Coast 50%
Bilateral 50%
Field of Activity:
Silviculture - Ecology - Soil conservation

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre en Côte-d'Ivoire (IV. 040)

IV. 043 — STATION SYLVICOLE DE SAN PEDRO

BP. 326, San Pedro
Tel.: 72

Location: W. 06.47 - N. 04.45 - 40 m
Climate: 1122 - Soils: AF
Staff: 1 technician - Language: French
Experimental fields:
Forest: 90 Ha
Financial support: $38,000
Government of the Ivory Coast 100%
Field of Activity:
Silviculture in dense forest

Par. Org: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre en Côte-d'Ivoire (IV. 040)

IV. 044 — STATION PISCICOLE DE BOUAKÉ

BP. 621, Bouaké
Tel. Add.: CETEFO - BOUAKE
Tel.: 63-21-70

Location: W. 05.05 - N. 07.50 - 290 m
Climate: 1411 - Soils: AP
Staff: 2 scientists, 1 technician - Language: French
Ponds for Pisciculture: 3 Ha
Teaching and popularization:
The training of Inspectors of Fisheries and Pisciculture (Level: end of secondary studies) - 1 year
Library and documentation:
100 volumes
Financial support: $60,800
Government of the Ivory Coast 50%
Bilateral 50%
Field of activity:
Hydrobiology - Fishing - Pisciculture

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre en Côte-d'Ivoire (IV. 040)

IV. 061 — STATION IRCT DE BOUAKÉ

BP. 604, Bouaké
Tel. Add.: IRCTE - BOUAKE
Tel.: 63-20-44, 63-20-45

Location: W. 05.02 - N. 07.41 - 338 m
Climate: 1411 - Soils: AF-AP-FR-RD
Staff: 10 scientists - Language: French
Experimental fiields:
Not irrigated crops: 58 Ha - Pastures: 64 Ha
Irrigated crops: 1 Ha - Forest: 25 Ha
Special Equipment:
Installation for cotton picking - Laboratory of fibre technology - Microfermentator - Ultracentrifuge - Freeze-dryer - Laboratory of cytogenetics - Insectarium
Teaching and popularization:
Training of probationers and of promoters
Library and documentation:
1,500 volumes - 40 periodicals
Publications:
Annual reports - Participation in " Coton et Fibres Tropicales " published by the IRCT (Paris)
Financial support: $602,000
Government of the Ivory Coast $^2/_3$
Bilateral . . . . . $^1/_3$
Field of activity:
Fundamental oriented research and research applied to cotton and to jute-like fibres in the following fields: Genetics - Cytogenetics - Varietal improvement - Phytotechny - Phytopathology - Entomology - Treatment and technology of fibres

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherche du Coton et des Textiles Exotiques (IRCT) Paris (FR. 150)

IV. 070 — REPRÉSENTATION PERMANENTE IRHO EN CÔTE-D'IVOIRE

BP. 1001, Abidjan
Tel. Add.: INSTHUIL - ABIDJAN
Tel.: Abidjan 269-85

This body is the representative in the Ivory Coast of the Institut de Recherches pour les Huiles et Oléagineux (IRHO), 11 Square Pétrarque, Paris XVI[e], France (FR. 160)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de la Recherche Scientifique (Côte-d'Ivoire)

IV. 071 — STATION IRHO DE LA MÉ

BP. 13 - Bingerville
Tel. Add.: INSTHUIL - BINGERVILLE
Tel.: 22-86-61 (Abidjan network)

Location: W. 03.05 - N. 05.07 - 23 m
Climate: 1122 - Soils: FX
Staff: 10 scientists, 5 technicians - Language: French
Experimental fields:
Not irrigated crops: 840 Ha - Irrigated crops: 3 Ha
Special Equipment:
Geiger counter, Entomotion (3 cells of 30 cubic metres) - collection of Elaeis
Teaching and popularization:
Training of plantation assistants (4 months), of leaders of village sectors (4 months), of group leaders (2 months) - Refresher courses, intended for technicians and for research workers and of variable duration, in the different fields of activity of the station.
Library and documentation:
350 works - 45 reviews and periodicals
Publications:
Participation in "OLÉAGINEUX, Revue internationale des Corps gras" published with the collaboration of the IRHO - Participation in the annual reports of the IRHO.
Financial support: $ 1,102,000
Government of the Ivory Coast 4%
Bilateral 4%
Private 16%
Self-Support 76%
Field of activity:
Genetics - Plant Physiology - Plant Biology (botany, taxonomy) - Pedology - Production and protection of yields (oil palm) - Application of radioactive tracers in agriculture - Extraction (treatment of the product).

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO)
Représentation permanente en Côte-d'Ivoire (IV. 070)

IV. 072 — STATION IRHO DE PORT-BOUET

BP. 7013, Abidjan - Aéroport
Tel. Add.: INSTHUIL - Port-Bouet
Tel.: 22-8-67 (Abidjan network)

Location: W. 03.03 - N. 05.07 - 20 m
Climate: 1122 - Soils: RD-QF
Staff: 5 scientists - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 541 Ha - Irrigated crops: 150 Ha
Special Equipment:
Collection of 45 varieties of coconut palm
Teaching and popularization:
Courses of variable duration intended for technicians and research workers
Library and documentation:
100 volumes
Publications:
Participation in "OLÉAGINEUX, Revue Internationale des Corps Gras" published with the collaboration of the IRHO - Participation in the annual reports of the IRHO.
Financial support: $416,548
Government of the Ivory Coast 25%
Bilateral 25%
Private 9%
Self-support 41%
Field of activity:
Specialized in the study of the coconut: Genetics - Plant Biology (botany, taxonomy) - Applied Agronomy - Production of yields - Protection of the harvests - Entomology of the coconut palm

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO)
Représentation permanente en Côte-d'Ivoire (IV. 070)

IV. 073 — PLANTATION EXPÉRIMENTALE IRHO DE GRAND-DREWIN

BP. 11, Sassandra
Tel. Add.: INSTHUIL-SASSANDRA

Location: W. 06.09 - N. 05.00 - 20 m
Climate: 1122 - Soils: FX
Staff: 1 scientist, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 70 Ha
Publications:
Participation in "OLÉAGINEUX, Revue Internationale des Corps Gras," published with the collaboration of the IRHO - Participation in the annual reports of the IRHO.
Financial support: $228,000
Self-support 100%
Field of activity:
Studies on the oil palm tree: applied Agronomy - Production and protection of the harvests (treatment of the product).

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO)
Représentation permanente en Côte-d'Ivoire (IV. 070)

IV. 074 — PLANTATION EXPÉRIMENTALE IRHO ROBERT MICHAUX

BP. 8, Dabou
Tel. Add.: INSTRUIL-DABOU
Tel.: 30-30-34

Location: W. 04.20 - N. 05.20 - 5 to 20 m
Climate: 1122 - Soils: FX
Staff: 3 scientists, 5 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 600 Ha
Publications:
Participation in "OLÉAGINEUX, Revue Internationale des Corps Gras," published with the collaboration of the IRHO - Participation in the annual reports of the IRHO.
Financial support: $760,000
Self-support 100%
Field of activity:
Study of the oil palm tree: applied Agronomy - Pro-

duction and Protection of the yields (treatment of the product).

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO)
Représentation permanente en Côte-d'Ivoire (IV. 070)

IV. 091 — STATION IRCA DE BIMBRESSO

BP. 1536, Abidjan
Tel. Add.: NAFRIC - ABIDJAN
Tel.: 22-61-54

Location: W. 04.08 - N. 05.18 - 20 m
Climate: 1122 - Soils: ?
Staff: 10 scientists, 2 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 551 Ha
Special Equipment:
Beckman LSO Scintillometer - Ultracentrifuge (L3-50 Beckman) - Micro-wave Autoclave - Greenhouse for multiplication
Teaching and popularization:
Training of specialized workers (3 weeks) - Training of local technicians (2 months) - Student engineers in course of specialization (3 - 6 months)
Library and documentation:
300 volumes - specialized card-indexes in agronomy, biochemistry, technology - Reproduction of documents by photo-copiers
Publications:
Annual reports - Participation in the " Revue générale des Caoutchoucs et Plastiques " published by the IRCA (Paris)
Financial support: $650,000
Government of the Ivory Coast 34%
Bilateral 39%
Private 27%
Field of activity:
Rubber: Plant biochemistry and physiology (formation of latex and of rubber, stability and flow of the latex) - Ecology - Soil science (fertility, mineral nutrition) - Production of yields (techniques of cultivation, manuring, vegetative improvement, maintenance, exploitation, tapping and collection) - Protection of yields - Chemistry and technology of latex and of rubber (chemical, physical and technological properties, specifications) - Processing of crude rubber.

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut de Recherches sur le Caoutchouc en Afrique (IRCA)
Paris (FR. 140).

IV. 110 — SECTION IFAC DE CÔTE-D'IVOIRE

BP. 1740, Abidjan
Tel.: Abidjan 32-13-09

This section is the representative in the Ivory Coast of the Institut Français des Recherches Frutières Outre-Mer (IFAC), 6 rue du Général Clergerie, Paris XVI^{e}, France (FR. 170)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de la Recherche Scientifique (Côte-d'Ivoire)

IV. 111 — STATION IFAC D'AZAGUIÉ

BP. 1740, Abidjan
Tel.: Azaguiré 4

Location: W. 04.00 - N. 05.40 - 120 m
Climate: 1122 - Soils: AO-BF
Staff: 5 scientists, 1 technician - Language: French (Occ. English - German - Spanish)
Experimental fields:
Not irrigated crops: 55 Ha - Irrigated crops: 25 Ha
Special Equipment:
Collection of banana-trees - Collection of fruit trees - Laboratory of Pedology
Teaching and popularization:
Training and specialization in the growing of fruit trees for agronomic engineers, agricultural technicians and specialized and executive staff (1 to 6 months)
Library and documentation:
200 volumes
Publications:
Bulletin d'Assistance Scientifique, Technique et Economique (monthly) - Annual reports - Participation in " FRUITS " published by the IFAC (Paris)
Financial support: $456,000
Government of the Ivory Coast 42.5%
Bilateral 42.5%
Self-support 15%
Field of activity:
Banana trees and fruit tree (citrus, avocado, mango, etc.) - Applied Agronomy - Phytopathology - Entomology - Haematology - Physiology - Pedology

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français de Recherches Fruitières Outre-Mer (IFAC)
Section de Côte-d'Ivoire (IV. 110)

IV. 112 — STATION IFAC D'ANGUÉDÉDOU

BP. 1740, Abidjan
Tel.: Abidjan 32-42-91

Location: W. 04.15 - N. 05.35 - 60 m
Climate: 1122 - Soils: FX
Staff: 6 scientists, 1 technician - Language: French (occ. English - German - Spanish)
Experimental fields:
Not irrigated crops: 45 Ha
Special Equipment:
Collection of pineapples - Experimental cold room - Laboratory of Physiology - Laboratory of Phytopathology - Laboratory of Entomatology and Nematology - Insectarium
Teaching and popularization:
Training and specialization in cultivation of pineapples for agronomic engineers, agricultural technicians and specialized and executive staff (1 to 6 months)
Library and documentation:
300 volumes
Publications:
Bulletin d'Assistance Scientifique, Technique et Economique (monthly) - Annual reports - Participation in " FRUITS " published by the IFAC (Paris)
Financial support: $228,000
Self-support 100%
Field of activity:
Pineapples: Agronomy - Entomology - Phytopathology - Physiology

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français de Recherches Fruitières Outre-Mer (IFAC)
Section de Côte-d'Ivoire (IV. 110)

IV. 130 — CENTRE DE RECHERCHES IFCC EN CÔTE-D'IVOIRE

BP. 1827, Abidjan
Tel.: Abidjan 530-04

This body is the representative in the Ivory Coast of the Institut Français du Café, du Cacao et autres plants stimulantes (IFCC), 34 rue des Renaudes, Paris XVII[e], France (FR. 180)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de la Recherche Scientifique (Côte-d'Ivoire)

IV. 131 — STATION CENTRALE IFCC DE DIVO

BP. 176, Divo

Location: W. 05.15 - N. 05.48 - 120 m
Climate: 1134 - Soils: AF
Staff: 6 scientists, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 236 Ha
Teaching and popularization:
Technical training of rural advisers (2 months) - Refresher course (15 days to 1 month)
Publications:
Annual reports - Participation in "Café, Cacao, Thé" published by the IFCC Paris
Financial support: $132,000
Government of the Ivory Coast ½
Bilateral . . . . . ½
Field of activity:
Coffee, cacao and stimulating plants: Genetics - Agronomy - Technology

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français du Café, du Cacao et autres plantes stimulantes (IFCC)
Centre de Recherches en Côte-d'Ivoire (IV. 130)

IV. 132 — STATION EXPÉRIMENTALE IFCC DE BINGERVILLE

BP. 1827, Abidjan
Tel.: Abidjan 30-30-04
Location: W. 03.53 - N. 05.22 - 80 m
Climate: 1122 - Soils: QF
Staff: 14 scientists, 11 technicians - Language: French (occ. English)
Special Equipment:
Neutron probe - Collection of cultivars of coffee, cacao and cola - Collection of insects
Library and documentation:
1,700 works - 68 reviews and periodicals - specialized card-indexes for coffee, cacao, cola.
Publications:
Annual reports - Participation in "Café, Cacao, Thé" published by the IFCC (Paris)
Financial support: $537,000
Government of the Ivory Coast ½
Bilateral . . . . . ½
Field of activity:
Genetics (selection of coffee, cacao and cola) - Agronomy (pedology, physiology, physico-chemistry, agrotechny) - Technology - Pathology (entomology, phytopathology) - Agronomic experimental work.

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français du Café, du Cacao et autres plantes stimulantes (IFCC)
Centre de Recherches en Côte-d'Ivoire (IV. 130)

IV. 133 — BASE DE MULTIPLICATION ET DE VULGARISATION IFCC DE SAN PEDRO

BP. 1287, Abidjan

Location: W. 06.40 - N. 04.50 - 50 m
Climate: 1121 - Soils: AF
Staff: 1 scientist - Language: French
Experimental fields:
Not irrigated crops: 17 Ha
Publications:
Annual reports - Participation in "Café, Cacao, Thé" published by the IFCC (Paris)
Financial support: $100,000
Government of the Ivory Coast 100%
Field of activity:
Coffee, cacao and stimulating plants: Genetics and Agronomy

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français du Café, du Cacao et autres plantes stimulantes (IFCC)
Centre de Recherches en Côte-d'Ivoire (IV. 130)

IV. 134 — BASE DE MULTIPLICATION ET DE VULGARISATION IFCC DE ZAGNÉ

BP. 1827, Abidjan

Location: W. 07.27 - N. 06.15 - 200 m
Climate: 1134 - Soils: AF-BF
Staff: 2 scientists, 1 technician - Language: French
Experimental fields:
Not irrigated crops: 19 Ha
Publications:
Annual reports - Participation in "Café, Cacao, Thé" published by the IFCC (Paris)
Financial support: $83,000
Government of the Ivory Coast 100%
Field of activity:
Coffee, cacao and stimulating plants: Genetics - Agronomy

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français du Café, du Cacao et autres plantes stimulantes (IFCC) - Centre de Recherches en Côte-d'Ivoire (IV. 130)

IV. 135 — ESSAIS IFCC DE TOMBOKRO

BP. 1827, Abidjan
Tel.: Abidjan 30-30-04

Location: W. 05.30 - N. 06.55 - 150 m
Climate: 1411 - Soils: JE
Staff: 1 scientist, Language; French
Experimental fields:
Not irrigated crops: 2 Ha
Publications:
Annual reports - Participation in "Café, Cacao, Thé" published by the IFCC (Paris)

Financial support: $38,000
Government of the Ivory Coast 100%
Field of activity:
Agronomy of the cacao-tree and of the coffee-shrub (irrigation)
Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)
Exec. Ag.: Institut Français du Café, due Cacao et autres plantes stimulantes (IFCC) - Centre de Recherches en Côte-d'Ivoire (IV. 130)

IV. 136 — STATION RÉGIONALE IFCC D'ABENGOUROU

BP. 147, Abengourou
Tel.: 51-30-98

Location: W. 03.28 - N. 06.47 - 200 m
Climate: 1134 - Soils: AF
Staff: 1 scientist, 1 technician - Language: French
Experimental fields:
Not irrigated crops: 71 Ha
Publications:
Annual reports - Participation in "Café, Cacao, Thé" published by the IFCC (Paris)
Financial support: $86,000
Government of the Ivory Coast ½
Bilateral . . . . . ½
Filed of activity:
Coffee, cacao and other stimulating plants: Genetics - Agronomy

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut Français du Café, du Cacao et autres plantes stimulantes (IFCC) - Centre de Recherches en Côte-d'Ivoire (IV. 130)

IV. 161 — CENTRE DE RECHERCHES ZOOTECHNIQUES DE MINANKRO-BOUAKÉ

BP. 1152, Bouaké

Location: W. 05.00 - N. 07.60 - 450 m
Climate: 1411 - Soils: ?
Staff: 5 scientists, 3 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 40 Ha - Irrigated crops: 15 Ha - Pastures: 360 Ha
Herds of N'Dama × Jersey cattle, Jersey, ½ blood Jersey × N'Dama, ¾ blood Jersey × N'Dama, 5/8 blood Jersey × N'Dama, 3/8 blood Jersey × N'Dama, Baoulais cattle, Nellore and Busera zebu cattle.
Special Equipment:
Live collections of tropical forage plants (550 introductions)
Teaching and popularization:
"Zootechny" course intended for works engineers and for doctors of veterinary science (2 to 4 months) - Course on "improvement of plants" intended for works engineers and for doctors of veterinary science (2 to 4 months) and for students and monitors (2 weeks)
Library and documentation:
400 volumes
Publications:
Annual reports - Reports for restricted publication - Participation in the Review of the IEMVT
Field of activity:
Cultivation of forage crops - Use of natural pastures - Production of animals and animal products (bovine, porcine, poultry).
Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (IEMVT) (FR. 120)

IV. 250 — INSTITUT POUR LA TECHNOLOGIE ET L'INDUSTRIALISATION DES PRODUITS AGRICOLES TROPICAUX (ITIPAT)

BP. 8881, Abidjan
Tel.: 31-13-14 and 31-12-78

Location: W. 04.00 - N. 05.20 - 0 m
Climate: 1122
Staff: 7 scientists, 7 technicians - Language: French (occ. English)
Special Equipment:
Biscuit manufacturing line - fruit juices line - drying line - extraction line - distillation line - mixing line - concentrator line - fermentation line - cooking line - Testing laboratory for analysis and microbiology
Teaching and popularization:
Course of perfection for tecnicians: analyses, technology, documentary practice (4 months)
Library and documentation:
600 works - 6,000 photocopies and reprints - 40 subscriptions - 18,000 reference slips classified on the Selecte system
Field of activity:
Food technology: Treatment of the coconut, extraction and concentration of fruit juices, industrialization of starches, improvement of the quality of cacao shells, irradiation of foodstuffs, conservation by dehydration.

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

IV. 300 — CENTRE ORSTOM D'ADIOPODOUMÉ

BP. 20, Abidjan
Tel.: 22-84-45, 37-44-45 and 37-41-70

Location: W. 04.07 - N. 05.20 - 40 m
Climate: 1122 - Soils: QF-FX
Staff: 61 scientists, 25 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 38 Ha - Pastures 14 Ha - Forest (ecological reserve) 100 Ha
Special Equipment:
X-ray diffractometer
Eight stations for measurement of erosion and of vertical and oblique drainage
Rain simulator (under construction)
Spectrometer for liquid scintillation
Neutron humiditimeters
Gamma densitimeters
Electrophoresis apparatus
Apparatus for microclimatic measurements
Laboratory for rhizology
Herbarium of the Ivory Coast
Attack room for study of pollens
Apparatus for measurement of respiratory intensity of nematode cysts
Teaching and popularization:
Possibility of training or of professional perfection in all the laboratories of the Centre. Each year, courses (15 days to 12 months) are organized at the request of ORSTOM of the Ivory Coast or of the neighbour States. Level: students higher teaching, engineer starting (training), technician, assistant. Moreover, each year some students of ORSTOM complete their second year of study.

Library and documentation:
5,400 works - 357 periodicals - Reprinting and reproduction of documents
Publications:
Participation in the periodicals published by ORSTOM (Paris): Annuaire Hydrologique, Bulletins et Index bibliographiques, Cahiers ORSTOM, Mémoires ORSTOM, Initiations et documentations techniques. Roneotype machine.
Field of activity:
Genetics - Physiology (forage plants) - Botany (cotton-tree, rubber) - Zoology - Ecology of mammals - Phytopathology - Entomology (ecology of insects) - Nematology - Cartography - Sedimentology - Geology (Alteration of rocks, metallogenesis) - Bioclimatology (evaporation-transpiration) - Physical geography (contacts of savannah/forest) - Utilization of radioisotopes (dry density, evaporation) - Pedology (organic materials, corrosion, fertility) - Hydrology (study of watersheds, moisture balance) - Silviculture (reafforestation: pedology, botany, bioclimatology).

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Office de la Recherche Scientifique et Technique d'Outre-Mer (ORSTOM) Paris (FR. 200)

IV. 301 — STATION ORSTOM DE MAN

BP. Man

Location: W. 07.36 - N. 07.21 - 338 m
Climate: 1132 - Soils: AF-FO-BF
Staff: 2 scientists, 1 technician - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 42 Ha
Publications:
Participation in the roneotypes published by the ORSTOM Centre at Adiopodoumé - Participation in the periodicals published by ORSTOM (Paris): Annuaire Hydrologique, Bulletins et Index bibliographiques, Cahiers Orstom, Mémoires Orstom, Initiation et documentations techniques
Field of activity:
see IV. 300

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Office de la Recherche Scientifique et Technique d'Outre-Mer (ORSTOM) - Centre en Côte-d'Ivoire (IV. 300)

IV. 310 — CENTRE ORSTOM DE PETIT BASSAM

BP. 4293 Abidjan
Tel.: 35-70-67

Location: W. 04.03 - N. 05.20 - 4 m
Staff: 15 scientists, 1 technician - Language: French (occ. English)
Special Equipment:
Photo-contact studio
Library and documentation:
1,300 works - Specialized card-indexes - Photo-copying equipment - Ozalid printing outfit - Roneo machine
Publications:
Temporary publications of the Centre - Participation in the Cahiers ORSTOM Serie Sciences Humaines
Field of activity:
Human Sciences

Par. Org.: Ministère de la Recherche Scientifique (Côte-d'Ivoire)

Exec. Ag.: Office de la Recherche Scientifique et Technique d'Outre-Mer (ORSTOM) Paris (FR. 200)

IV. 340 — CENTRE SUISSE DE RECHERCHES SCIENTIFIQUES EN CÔTE D'IVOIRE — CSRS

ADIOPODOUME
BP. 103, Abidjan

Location: W. 04.07 - N. 05.20 - 40 m
Staff: 3 scientists, 2 technicians - Language: French and German
Field of activity:
This Centre is a base for Swiss research workers who wish to carry out research in the Ivory Coast, principally in botany, zoology, phytosociology, biology of plants and animals, and parasitology

Par. Org.: Société Helvétique des Sciences Naturelles

LIBERIA (LI)

FRAMEWORK OF AGRICULTURAL RESEARCH IN LIBERIA

In Liberia Agricultural Research is the responsibility of the Ministry of Agriculture. The Minister of Agriculture is assisted by one Deputy Minister and three Assistant Ministers; one of whom is directly dealing with research. The Director of Research, who is also concurrently the Director of the Central Agricultural Experiment Station, reports to the Assistant Minister of Agricultural for Technical Services.

The William R. Tolbert, Jr. College of Agriculture and Forestry is controlled by an autonomous body, the University of Liberia. The funding of certain Development Projects at the College is through the Ministry of Agriculture. Close cooperation exists between the Ministry and the College.

The research by the Firestone Plantation Company is mainly concerned with rubber. By agreement, the results of this research are available to the Rubber Planters Association of Liberia.

The Liberian Agricultural Company had a US-AID contract for research in the possibilities of large scale commercial farming. After the termination of the contract, some work is still being carried out by the company with its own resources.

LI. 012 — CENTRAL AGRICULTURAL EXPERIMENT STATION SUAKOKO

P.O. Box Suakoko

Location: W. 09.30 - N. 06.58 - 255/265 m
Climate: 1471 - Soils: ?
Staff: 15 scientists, 10 technicians - Language: English
Experimental fields:
Non irrigated crops: 160 Ha - Irrigated crops: 12 Ha - Pastures: 80 Ha - Ponds for pisciculture: 18 Ha
Library and documentation:
440 volumes - 395 bulletins - 25 journals (current subscription)
Financial support: $131,500
Government of Liberia 100%
Field of activity:
Pedology - Soil management - Crop production (rice: selection, multiplications) - Fruits (citrus, mangoes, avocadoes, pineapples) - Vegetables - Entomology - Animal production and health (cattle, poultry, swine) - Continental fisheries - Pisciculture - Cultural technology

Par. Org.: Ministry of Agriculture (Liberia)

LI. 030 — FIRESTONE PLANTATIONS COMPANY

Harbel
Tel. Add.: FPCO - HARBEL

Par. Org.: Firestone Natural Rubber and Latex Cy, Akron, Ohio (USA)

LI. 031 — BOTANICAL RESEARCH DEPARTMENT, FIRESTONE PLANTATIONS COMPANY

Harbel, Liberia
Tel.: 2286

Location: W. 10.25 - N. 06.23 - 100 m
Climate: 1121 - Soils: ?
Staff: 4 scientists, 9 technicians - Language: English
Experimental fields:
Non irrigated crops: 240 Ha - Irrigated crops: 46 Ha - Pastures: 4 Ha
Specialized equipment:
Hevea rubber seed collection - Botanical introduction garden - Trace elements laboratory - Computer
Training facilities:
Subjects taught at University of Liberia to 3rd and 4th year students in School of Agriculture and Forestry: Botanical Aspects of Hevea Brasiliensis (1 week) - Breeding and Selection (1 week) - Disease and Pests (1 week) - Tapping systems and yield stimulation (1 week)
Library and documentation:
1,800 volumes with specialized card indexes
Publications:
Monthly, quarterly and annual reports of research activities - Monthly and annual meteorological reports
Financial support: $232,020
Private 100%
Field of activity:
Breeding and selection of new rubber clones and seedling families - Fertilization of immature and mature rubber - Control of diseases of hevea - Experiments on methods of tapping rubber trees and of husbandry maintenance - Introduction and testing of plants of economic importance other than rubber (citrus, mango, oil palm, castor oil ...).

Par. Org.: Firestone Natural Rubber and Latex Company, Akron, Ohio (USA)

Exec. Ag.: Firestone Plantations Cy (LI. 030)

MALI (ML)

ML. 020 — DIRECTION RÉGIONALE IRCT POUR LE MALI

BP. 114, Bamako
Tel. Add.: IRCTE - BAMAKO
Tel.: 242-93

This Regional Administration is the representative in Mali of the Institut de Recherches du Coton et des Textiles Exotiques (IRCT), 34 rue des Renaudes, Paris XVIII^{e}, France (FR. 150)
Location: W. 08.00 - N. 12.40 - 340 m
Climate: 1484 - Soils: LF
Staff: 2 scientists - Language: French
Library and documentation:
260 works and documents - 25 reviews
Publications:
Annual reports - Technical booklets - Participation in "Coton et Fibres Tropicales" published by the IRCT (Paris)
Financial support: $53,500
Government of Mail 31%
Bilateral 69%
Field of activity:
Applied research on cotton and jute-like fibres

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de la Production du Mali

ML. 021 — CELLULE EXPÉRIMENTALE IRCT DE KOGONI

Kogoni (via Niono)

Location: W. 06.02 - N. 14.44 - 273 m
Climate: 1534 - Soils: VC-LF
Staff: 2 technicians - Language: French
Experimental fields:
Irrigated crops: 25 Ha
Publications:
Annual reports - Participation in "Coton et Fibres Tropicales" published by the IRCT (Paris)
Financial support: $12,400
Government of Mali 100%
Field of activity:
Entomology - Agronomy (irrigated cultivation) - Physiology of cotton

Par. Org.: Ministère de la Production (Mali)

Exec. Ag.: Institut de Recherches du Coton et des Textiles Exotiques (IRCT) Direction Régionale pour le Mali (ML. 020)

ML. 022 — STATION IRCT DE N'TARLA M'PESOBA

BP. 28, Koutiala
Tel. Add.: IRCTE, Koutiala

Location: W. 05.42 - N. 12.35 - 308 m
Climate: 1533 - Soils: LF
Staff: 5 scientists, 5 technicians - Language: French
Experimental fields:
Not irrigated crops: 64 Ha (Station and outstations)
Special equipment:
Retting vats for jute-like fibres - Experimental installation for picking (1 picker 20 Continental saws)
Teaching and Extension:
Training of staff for production of textiles, cotton and hibiscus (6 months)
Library and documentation:
750 works and documents - 20 collections of reviews
Publications:
Annual reports - Specialized articles - Participation in "Coton et Fibres Tropicales" published by the IRCT (Paris)
Financial support: $349,000
Government of Mali 27%
Bilateral 53%
Multilateral 20%
Field of activity:
Cultivation of cotton under pluvial condition of management (varietal selection, agronomy: fertilization and rotations, entomology, phytosanitary protection) - Cultivation of jute-like fibres (varietal selection, agronomy: fertilization, technological preparation of fibres intended for sacking).

Par. Org.: Ministère de la Production (Mali)

Exec. Ag.: Institut de Recherches du Coton et des Textiles Exotiques (IRCT) Direction Régionale pour le Mali (ML. 020)

ML. 040 — MISSION IFAC AU MALI

BP. 30, Bamako

This mission is the representative in Mali of the Institut Français de Recherches Fruitières d'Outre-Mer (IFAC), 6 rue du General Clergerie, Paris XVI^{e}, France (FR. 170)

The research work is carried on in the Centre National de Recherches Fruitières de Bamako (ML. 041) and on the outstations at Baguineda, Sikasso and Katibougou.

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France) Ministère de la Production du Mali (Institut d'Economie Rurale)

ML. 041 — CENTRE NATIONAL DE RECHERCHES FRUITIÈRES DE BAMAKO (IFAC)

BP. 30, Bamako
Tel.: 232-15

Location: W. 08.00 - N. 12.60 - 360 m
Climate: 1485 - Soils: GE-GD
Staff: 3 scientists - Language: French
Experimental fields:
Irrigated crops: 20 Ha
Special Equipment:
Genetic collections of fruit trees - Pilot workshops for technological research
Teaching and popularization:
Specialized course in fruit-tree cultivation and conditioning intended for agents of the agricultural services and for students of the rural polytechnical Institute (variable duration)
Library and documentation:
60 volumes - Analytical documentation published by the IFAC office in Paris
Publications:
Annual reports - Participation in the review "Fruits" published by the IFAC (Paris)
Financial support: $109,930
Government of Mali 48%
Bilateral 52%
Field of activity:
Cultivation of fruit trees - Varietal improvement - Cultivation techniques - Technology of citrus fruits - Pineapples - Bananas - Mangoes

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)
Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) - Mission au Mali (ML. 040)

ML. 060 — AGENCE AU MALI

BP. 438, Bamako

This body is the representative in Mali of the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), 110 rue de l'Université, Paris VII^{e}, France (FR. 130)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France) Ministère de la Production du Mali (Institut d'Economie Rurale)

ML. 061 — STATION IRAT DE SOTUBA

BP. 438, Bamako
Tel. Add.: IRATROP - BAMAKO
Tel.: 224-71

Location: W. 08.00 - N. 12.40 - 220 m
Climate: 1484 - Soils: LF
Staff: 4 scientists, 3 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 20 Ha
Library and documentation:
200 volumes
Publications:
Participation in "Agronomie Tropicale' published by the IRAT (Paris)
Financial support: $68,000
Government of Mali 60%
Bilateral 40%
Field of activity:
Soil science (pedology, fertilization) - Production of the harvests (rice, cereals) - Genetics (rice, cereals, sugar cane)

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 062 — SOUS-STATION IRT DU SÉNO

Seno

Location: W. 03.10 - N. 14.20 - 220 m
Climate: 1534 - Soils: RC-QC
Staff: 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 15 Ha
Financial support: $5,000
Government of Mali 100%
Field of activity:
Production and protection of the yields (cereals)

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 063 — SOUS-STATION IRAT DE KITA

Kita

Location: W. 09.20 - N. 11.00 - 240 m
Climate: 1484 - Soils: QL-LF
Staff: 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 15 Ha
Financial support: $5,000
Government of Mali 100%
Field of activity:
Production and protection of the harvests (groundnuts)

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 064 — STATION IRAT DE KATIBOUGOU

BP. 16, Koulikoro

Location: W. 07.40 - N. 12.50 - 220 m
Climate: 1484 - Soils: LF
Staff: 1 scientist, 2 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 20 Ha
Library and documentation:
20 volumes
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris) and in "Oléagineux" published by IRHO (Paris)
Financial support: $40,000
Government of Mali ½
Bilateral . . . . . ½
Field of activity:
Besides research work concerning food crops, research is carried out at this station on oleaginous plants. The latter work is done for the benefit of the IRHO.

Par. Org.: Ministère de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 065 — SOUS-STATION IRAT DE SIKASSO

BP. 20, Sikasso

Location: W. 05.30 - N. 11.10 - 230 m
Climate: 1484 - Soils: QL-LF
Staff: 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 8 Ha - Irrigated crops: 12 Ha
Financial support: $6,400
Government of Mali 80%
Multilateral 20%
Field of activity:
Study of soils - Cultivation techniques (rice)

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 066 — STATION IRAT DE MOPTI

BP. 119, Mopti
Tel.: Mopti 33

Location: W. 04.12 - N. 14.30 - 269 m
Climate: 1542 - Soils: ?
Staff: 4 scientists, 5 technicians - Language: French (occ. English)
Experimental fields:
Irrigated crops: 38 Ha
Library and documentation:
50 volumes
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris)
Financial support: $88,000
Government of Mali 25%
Bilateral 50%
Multilateral 25%
Field of activity: Floating Rice
(Varietal improvement - Cultivation techniques - Fertilization)

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 067 — STATION IRAT DE KOGONI

Kogoni, via Niono

Location: W. 06.00 - N. 14.50 - 230 m
Climate: 1534 - Soils:
Staff: 2 scientists, 6 technicians - Language: French (occ. English)
Experimental fields:
Irrigated crops: 60 Ha
Library and documentation:
100 volumes
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris)
Financial support: $80,000
Government of Mali 70%
Bilateral 30%
Field of activity:
Varietal improvement: rice and cereals in dry cultivation - Fertilization - Out-of-season cultivation.

Par. Org.: Ministère de la Production du Mali (Institut d'Economie Rurale)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Mali (ML. 060)

ML. 080 — SERVICE DES EAUX ET FORÊTS

Bamako

Par. Org.: Ministère de la Production du Mali

ML. 081 — LABORATOIRE D'HYDROBIOLOGIE DE MOPTI

BP. 91, Mopti
Tel.: Mopti 28

Location: W. 04.00 - N. 14.30 - 0 m
Climate: 1542
Staff: 1 scientist, 2 technicians - Language: French
Special Equipment:
Microscopes - Precision balances - Apparatus for scalimetry [measurement of scales (of fish)]
Teaching and popularization:
Courses for specialization in fisheries and hydrobiology for Forestry Engineers of the Polytechnical Institute at Katibougou (6 months)
Financial support: $1,819,000
Government of Mali 100%
Field of activity:
Hydrobiology: Biological study of the commercialized species (age of growth, frequencies, diet, reproduction, migration) - Systematic classification (survey of certain biotypes and particularly of the lakes in order to discover new species) - Applied research (study of the efficacity of insecticides in the control of ichthyophagous insects).

Par. Org.: Ministère de la Production du Mali

Exec. Ag.: Service des Eaux et Forêts (ML. 080)

ML. 110 — DIVISION DE LA RECHERCHE AGRONOMIQUE DE L'INSTITUT D'ÉCONOMIE RURALE

BP. 281, Bamako

Par. Org.: Ministère de la production du Mali

ML. 111 — SECTION DES ESSAIS MULTILOCAUX

BP. 281, Bamako

Location: W. 08.00 - N. 12.40 - 340 m
Climate: (1484)
Staff: 2 scientists, 2 technicians - Language: French
Library and documentation:
200 volumes
Publications:
Annual reports
Financial support: $2,146,000
Government of Mali 100%
Field of activity:
Varietal experimental work (rice, groundnuts, maize, sorghum, millet) - Fertilization
Includes the following outstations, where the experiments are carried out:
OUTSTATION AT SAMANKO
W. 08.05 - N. 12.33 - 349 m
Climate: (1484) - Soils: LF + LS
Not irrigated crops: 10 Ha
Financial support: $282,000 Government of Mali
STATE FARM AT M'PESOBA
W. 05.43 - N. 12.24 - 302 m
Climate: (1532) - Soils: LF
Not irrigated crops: 12 Ha
Financial support: $324,000 Government of Mali

Par. Org.: Ministère de la Production du Mali

Exec. Ag.: Division de la Recherche Agronomique de l'Institut d'Economie Rurale du Mali (ML. 110)

ML. 200 — ORGANISATION INTERNATIONALE CONTRE LE CRIQUET MIGRATEUR AFRICAIN (OICMA)

BP. 136, Bamako
Tel. Add.: ANTIACRI - BAMAKO
Tel.: Bamako 31-21

Intergovernmental international organization, devoted to the control campaign against the African migratory locust, undertakes research work (applied research).
Staff: 136, of whom 6 are scientists.
Laboratories: of 75 square miles
Library and documentation:
300 volumes, 20 periodicals received annually
Publications:
Diffusion of publications
Remark:
Set up by an international convention signed at Kano (Nigeria) on the 25th May, 1962 (constitutes a sequel to the provisional international Committee for the prevention of acridians of the French Sudan, set up in 1948); groups the following 22 countries: French Cameroons, Central African Republic, People's Republic of the Congo, Ivory Coast, Dahomey, Gambia, Ghana, Upper Volta, Kenya, Mali, Mauritania, Niger, Nigeria, Uganda, Senegal, Sierra Leone, Sudan, Tanzania, Chad, Togo, Zaire and Zambia; includes a technical centre at Kara via Macina (ML. 201)
Field of activity:
Anti-acridian control (botany, biology, ecology and population dynamics of migratory locusts, insecticides, operational techniques).

ML. 201 — CENTRE TECHNIQUE OICMA DE KARA MACINA

BP. 136, Bamako
Tel. Add.: ANTIACRI - BAMAKO
Tel.: Bamako 31-21

Location: W. 05.01 - N. 14.07 - 271 m
Climate: 1534
Staff: 5 scientists, 12 technicians - Language: French/English
Special Equipment:
Herbarium - Collection of insects (Acrididae)
Teaching and popularization:
Courses: acridology - supervision and control (1 to 2 weeks)
Library and documentation:
600 volumes - periodical indexing under author and subject Locusta migratoria
Publications:
" Locusta " published by CICMA
Financial support: $300,000
Multilateral 100%
Field of activity:
Anti-acridian control: Botany - Biology - Ecology and population dynamics of migratory locusts - Insecticides - Operational techniques

Exec. Ag.: Organisation Internationale contre le Criquet Migrateur Africain (OICMA)

ML. 801 — STATION AGRONOMIQUE DE SAMÉ

BP. 84, Kayes

Location W. 11.20 - N. 14.20
Climate: 1532 - Soils: ?
Staff: 2 scientists, 1 technician - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 15 Ha - Irrigated crops: 1 Ha
Publications:
Reports of activities

Financial support: $178,600
Government of Mali 30%
Multilateral 70%
Field of activity:
Principal Station for climatology and Agronomic Research

Par. Org.: Organisation pour la Mise en Valeur de la Vallée du Sénégal
Ministère de la Production du Mali

Exec. Ag.: Projet FAO pour le Développement de la Recherche Agronomique dans le Bassin du Fleuve Sénégal (SG. 800)

MAURITANIA (MR)

MR. 050 — MISSION IFAC EN MAURITANIE

BP. 87, Nouakchott

This mission represents in Mauritania the Institut Français de Recherches Fruitières Outre-Mer (IFAC), 6 rue du Général Clergerie, Paris XVI^{e}, France (FR. 170)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère du Développement Rural de Mauritanie

MR. 051 — CENTRE DE RECHERCHES FRUITIÈRES ET DE LUTTE BIOLOGIQUE (IFAC)

BP. 87, Nouakchott
Tel.: 26-57

Location: W. 15.58 - N. 18.06 - 1 m
Climate: 3140 - Soils: QC
Staff: 1 scientist, 1 technician
Experimental fields:
Irrigated crops: 0.10 Ha
Special Equipment:
Quarantine for the rearing of insects for biological control
Teaching and popularization:
Specialization courses for agricultural supervisors (3 months)
Library and documentation:
200 volumes - Specialized entomological reviews
Publications:
Annual reports - Participation in the review "Fruits" published by the IFAC (Paris)
Financial support: $72,200
Government of Mauritania ½
Bilateral . . . . . ½
Field of activity:
Date-palm: Agronomy - Biological control - Protection of crops - Technology (conditioning) - Selection - Adaptation

To this centre the following outstations are attached. It is at these outstations that the experiments in biological intervention are carried out against the white bug [Hemiptera] of the date-palm:
OUTSTATION AT ATAR
W. 13.03 - N. 20.31 - 255 m
Climate: 3210 - Soils: BG
OUTSTATION AT TIDJIKJA
W. 11.25 - N. 18.32 - 314 m
Climate: 3220 - Soils: BG
OUTSTATION AT KANKOSSA
W. 11.32 - N. 15.56
Climate: 1534 - Soils: BG

Par. Org.: Ministère du Développement Rural (Mauritanie)

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC)
Mission en Mauritanie (MR. 050)

MR. 052 — STATION PHOENICICOLE DE KANKOSAS (IFAC)

BP. Kankossa, via Kiffa

Location: W. 11.32 - N. 15.56
Climate: 1534 - Soils: QC
Staff: 1 scientist, 1 technician - Language: French
Experimental fields:
Not irrigated crops: 5 Ha - Irrigated crops: 40 Ha
Pastures: 5 Ha - Forest: 5 Ha
Special Equipment:
Study factory for the transformation of the date and of its by-products
Teaching and popularization:
Specialized courses in date cultivation intended for supervisors of agriculture (3 to 6 months)
Financial support: $50,540
Government of Mauritania ½
Bilateral . . . . . ½
Field of activity:
Research on the date-palm

Par. Org.: Ministère du Développement Rural (Mauritanie)

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC)
Mission en Mauritanie (MR. 050)

MR. 053 — PÉRIMÈTRE FRUITIER DE RINDIAO (IFAC)

BP. 56, Kaedi

Location: W. 13.30 - N. 16.09
Climate: 1534 - Soils: JC
Experimental fields:
Irrigated crops: 8 Ha - Forest: 1 Ha
Teaching and popularization:
Elementary certificate (? diploma) in irrigation, plantation and sowing of fruit-trees in the framework of the National training school (Ecole Nationale de formation) - Lectures according to demand
Library and documentation:
30 volumes

Financial support: $57,000
Government of Mauritania ½
Bilateral . . . . . ½
Field of activity:
Tropical fruits of the subarid zones

Par. Org.: Ministère du Développement Rural (Mauritanie)

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC)
Mission en Mauritanie (MR. 050)

MR. 801 — CENTRE NATIONAL D'EXPÉRIMENTATION AGRONOMIQUE ET DE DÉVELOPPEMENT AGRICOLE DE KAEDI

BP. Kaedi

Location: W. 13.31 - N. 16.09 - 12 m
Climate: 1534 - Soils: ?
Staff: 2 research workers, 1 technician - Language: French
Experimental fields:
Irrigated crops: 11 Ha
Special Equipment:
Neutron probe
Publications:
Reports on activities
Financial support: $313,500
Government of Mauritania %
Multilateral 69%
Field of activity:
Principal station for climatology - Irrigation - Rice cultivation

Par. Org.: Organisation pour la Mise en Valeur de la Vallée du Sénégal (OMVS)
Ministère du Développement Rural (Mauritanie)

Exec. Ag.: Projet FAO pour le développement de la Recherche Agronomique dans le Bassin du Fleuve Sénégal (SG. 800)

NIGER (NG)

NG. 020 — AGENCE IRAT DU NIGER

BP. 150, Niamey
Tel. Add.: IRATROP - NIAMEY
Tel.: Niamey 20-70

This body is the representative in Niger of the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), 110 rue de l'Université, Paris VII^{e}, France (FR. 130)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de l'Economie Rurale du Niger

NG. 021 — LABORATOIRE DE RADIOAGRONOMIE — SECTION « ÉCONOMIE DE L'EAU » (IRAT)

BP. 150, Niamey
Tel. Add.: IRATROP - NIAMEY
Tel.: Niamey 20-70

Location: E. 02.08 - N. 13.30 - 216 m
Climate: 1530 - Soils: QL-BC-BV-VC
Staff: 1 scientist - Language: French
Special Equipment:
2 automatic neutron Humiditimeters (CEA Bertin)
1 Gamma Densitimeter (DR18) - 2 scales for reckoning (511)
1 surface Humiditimeter with point - 1 reader for Bertin mini-cassette
Library and documentation:
100 volumes - 2 periodical reviews
Publications:
Participation in the annual Reports of the IRAT/NIGER
Financial support: $57,000
Bilateral 100%
Field of activity:
Study of soil - water - plant relationships

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence du Niger (NG. 020)

NG. 022 — LABORATOIRE ENTOMOLOGIQUE DES RADIOISOTOPES (IRAT)

BP. 150, Niamey
Tel. Add.: IRATROP - NIAMEY
Tel.: Niamey 20-70

Location: E. 02.08 - N. 13.30 - 216 m
Staff: 1 scientist - Language: French
Special Equipment:
1 Analyser, multi-tube (Kevotion) - 4 radiation detectors
Library and documentation:
100 volumes, specialized in entomology and utilization of isotopes
5 specialized reviews
Publications:
Participation in the annual Reports of the IRAT/NIGER
Financial support: $19,000
Bilateral 100%
Field of activity:
Entomology, Utilization of radioisotopes for the study and control of insects

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence du Niger (NG. 020)

NG. 023 — STATION IRAT DE TARNA

BP. 6, Maradi
Tel. Add.: IRATROP - MARADI
Tel.: Maradi 281

Location: E. 07.06 - N. 13.27 - 350 m
Climate: 1532 - Soils: QL-JE-GE
Staff: 2 scientists, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 66 Ha - Irrigated crops: 14 Ha
Teaching and popularization:
Refresher courses for supervisors and leaders of agriculture (15 days)

Library and documentation:
700 volumes - 10 specialized reviews - photocopying machine
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris)
Participation in the Annual Reports of IRAT/NIGER
Financial support: $144,400
Government of Niger 39%
Bilateral 61%
Field of activity:
Improvement of plants (cereals, groundnuts, leguminous plants)
Agropedology - Cultivation techniques

To this station are attached the following outstations, where experimental work is carried out:
OUTSTATION AT IBOHAMANE via Keita
E. 05.56 - N. 14.49 - 380 m
Climate: 1534 - Soils: QC-RE-RC-JE-VE
Irrigated crops: 16 Ha
Financial support: $38,000 Bilateral
OUTSTATION AT KAWARA via Dogueraoua
E. 05.40 - N. 14.04 - 273 m
Climate: 1533 - Soils: QL-VE
Not irrigated crops: 15 Ha - Irrigated crops: 2 Ha
Financial support: $7,600 Niger Government
OUTSTATION AT MAGARIA
E. 08.55 - N. 13.00 - 360 m
Climate: 1917 - Soils: QL-LG
Not irrigated crops: 12 Ha
Financial support: $7,600 Niger Government

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence du Niger (NG. 020)

NG. 024 — STATION IRAT DE KOLO

BP. 118, Niamey
Tel.: 24-00

Location: E. 02.20 - N. 13.18 - 190 m
Climate: 1533 - Soils: QL-JE-GE
Staff: 1 scientist, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 20 Ha - Irrigated crops: 35 Ha
Special Equipment:
Experimental micro-rice field
Library and documentation:
500 volumes - 3 periodical reviews
Publications:
Participation in the Annual Reports of the IRAT/NIGER
Financial support: $76,000
Government of Niger 50%
Bilateral 50%
Field of activity:
Rice cultivation (Varietal improvement, fertilization, cropping practices)

To this station are attached the following outstations, where experiments are carried out:
OUTSTATION AT SIMIRI
E. 02.08 - N. 14.08 - 250 m
Climate: 1534 - Soils: QL
Not irrigated crops: 10 Ha
Financial support: $7,600 Niger Government
OUTSTATION AT KALA-PATÉ via Birni N'Gaouré
E. 02.56 - N. 13.14 - 190 m
Climate: 1533 - Soils: QL-QC
Not irrigated crops: 10 Ha
Financial support: $7,600 Niger Government

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence du Niger (NG. 020)

NG. 025 — STATION CANNE À SUCRE DE TILLABÉRY (IRAT)

Tillabery
Tel.: Tillabery 58

Location: E. 01.27 - N. 14.15 - 209 m
Climate: 1534 - Soils: BE-BV
Staff: 1 scientist, 1 technician - Language: French
Experimental fields:
Irrigated crops: 20 Ha
Special Equipment:
Laboratory for the technology of sugar cane
Library and documentation:
5 specialized periodical reviews (sugar cane)
Publications:
Annual reports
Financial support: $131,000
Niger Government 100%
Field of activity:
Sugar cane: agronomic experimental work - varietal improvements

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence du Niger (NG. 020)

NG. 040 — CENTRE CTFT NIGER — HAUTE-VOLTA

BP. 225, Niamey (Niger)

This body is the representative in Niger and in Upper Volta of the Centre Technique Forestier Tropicale (CTFT), Avenue de la Belle Gabrielle 93, Nogent-sur-Marne (France) (FR. 110)

This Centre comprises two sections, the CTFT Niger section (NG. 041) and the CTFT Upper Volta section (UV. 090)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de l'Economie Rurale du Niger
Ministère de l'Agriculture, de l'Elevage, des Eaux et Forêts de Haute-Volta

NG. 041 — SECTION CTFT DU NIGER

BP. 225, Niamey

Location: E. 02.06 - N. 13.32 - 205 m
Climate: 1534 - Soils: QL
Staff: 1 scientist, 2 technicians - Language: French
Experimental fields:
Forest: 82.5 Ha
Special Equipment:
Equipment for the protection and the reclamation of soils
Frames for cuttings
Teaching and popularization:
Course on conservation of soils (20 hours)
Course for engineers undergoing training with rural equipment (1 month)
Library and documentation:
200 works
Publications:
Participation in "Bois et Forêts des Tropiques" published by the CTFT (France)

Financial support: $1,410,000
Niger Government 46%
Bilateral 54%
Field of activity:
Silviculture in the Sahelo-soudanian zone (bioclimatology, introduction of exotic species ...)
Conservation of the soils and control of erosion - Genetics and forest ecology

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) Centre Niger - Haute-Volta (NG. 040)

NG. 051 — STATION IRCT DE MALBAZA

BP. 6, Malbaza

Location: E. 05.20 - N. 14.50 - 300 m
Climate: 1534 - Soils: JE-QL-LF
Staff: 1 scientist - Language: French
Experimental fields:
Experimental plots dispersed in rural surroundings and having a variable surface.
Publications:
Annual reports - Occasionally specialized articles - Participation in "Coton et Fibres Tropicales" published by the IRCT (Paris)
Financial support: $51,800
Bilateral 100%
Field of activity:
Experimental work on cotton (varietal selection under different conditions of cultivation) - Phytotechny - Fertilization - Phytosanitary treatments.

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut de Recherche du Coton et des Textiles Exotiques (IRCT) - Paris (FR. 150)

NG. 060 — SERVICE DE L'ÉLEVAGE ET DES INDUSTRIES ANIMALES

BP. 241, Niamey

This service comprises the centre for goat breeding and rearing and the poultry station at Maradi, the experimental Sahelian station at Toukounous and the pilot farm at Kirkissaye. It also assumes the responsibility for a project of control of trypanosomiasis with the aid of the Deutsche Förderungsgesellschaft für Entwicklungsländer, 600 Frankfurt/Main 1, Oberlindau 54-56 (RFA)

Par. Org.: Ministère de l'Economie Rurale (Niamey)

NG. 061 — CENTRE D'ÉLEVAGE CAPRIN

BP. 139, Maradi
Tel.: Maradi 70-389

Location: E. 07.00 - N. 13.30
Climate: 1532
Staff: 1 scientist, 3 technicians - Language: French
Experimental fields:
Pastures: 1,800 Ha (traversing the Sahelian zone)
Not irrigated crops: 7 Ha
Financial support: $308,480
Niger Government 40%
Bilateral 60%

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Service de l'Elevage et des Industries Animales (NG. 060)

NG. 062 — STATION AVICOLE DE MARADI

BP. 139, Maradi
Tel.: Maradi 70-389

Location: E. 07.00 - N. 13.30
Climate: 1532
Staff: 7 technicians - Language: French

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Service de l'Elevage et des Industries Animales (NG. 060)

NG. 063 — STATION SAHÉLIENNE EXPÉRIMENTALE DE TOUKOUNOUS

Toukounous/ Filingué

Location: E. 03.20 - N. 14.20 - 225 m
Climate: 1534
Staff: 3 scientists, 7 technicians - Language: French (occ. German)
Experimental fields:
Not irrigated crops: 16 Ha - Pastures: 44.8 Ha (traversing the Sahelian zone)
Special Equipment:
Herbarium
Teaching and popularization:
Course intended for young breeders (3 months) - Rural enlistment (permanent)
Publications:
Participation in "Tierärztliche Wochenschrift Verlag" Hamburg - RFA
Financial Support: $224,000
Niger Government 100%
Field of activity:
Research on Azawack zebu cattle

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Service de l'Elevage et des Industries Animales (MG. 060)

NG. 064 — FERME PILOTE DE KIRKISSOYE

BP. 241, Niamey

Location: E. 02.08 - N. 13.30 - 216 m
Climate: 1534
Staff: 6 technicians - Language: French
Experimental fields:
Irrigated crops: 36 Ha
Publications:
Monthly and Annual reports
Field of activity:
Settling of peasant families on the irrigated perimeter as a co-operative for the production of milk to supply Niamey - Intensive feeding of housed cattle for the export of meat

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Service de l'Elevage et des Industries Animales (NG. 060)

NG. 081 — LABORATOIRE D'ÉLEVAGE IEMVT DE NIAMEY

BP. 485, Niamey
Tel. Add.: LABELVA - NIAMEY
Tel.: Niamey 20-09

Location: E. 02.08 - N. 13.30 - 200 m
Staff: 3 scientists, 1 technician - Language: French

Special Equipment:
3 Freeze-dryers (capacity 20 kg. water per cycle)
1 general herbarium of the plants of Niger
Teaching and popularization:
Course intended for assistant breeders and for veterinarians undergoing training: laboratory diagnosis of infectious and parasitic diseases (1 to 2 months)
Library and documentation:
83 volumes
Publications:
Participation in "Revue d'Elevage et de Médecine Vétérinaire des Pays Tropicaux" published by the IEMVT (France)
Financial support: $107,400
Niger Government ½
Bilateral . . . . . ½
Field of activity:
Animal health - Microbiology - Virology - Helminthology

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (IEMVT) France (FR. 120)

NG. 160 — MISSION IFAC AU NIGER

BP. 886, Niamey

This mission represents in Niger the Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) - (FR. 170), 6 rue du Général Clergerie, Paris XVI[e], France

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de l'Economie Rurale du Niger

NG. 161 — STATION EXPÉRIMENTALE IFAC DE GABOUGOURA

Gabougoura near Niamey

Location: E. 02.08 - N. 13.30 - 216 m
Climate: 1534 - Soils: BE-BV-JE-GE
Staff: 1 scientist - Language: French (occ. English)
Experimental fields:
Irrigated crops: 13 Ha
Special Equipment:
Collections of cultivars (citrus - mangoes)
Teaching and popularization:
Courses and refresher courses in fruit-tree cultivation and popularization intended for those responsible for agriculture and for volunteers undergoing training (variable duration)
Library and documentation:
40 volumes - 6 specialized reviews
Publications:
Reports of activities - Participation in "Fruits" published by IFAC (Paris) - Production of technical leaflets distributed by the Ministry of the Rural Economy of the Niger.
Financial support: $164,100
Niger Government 46%
Bilateral 54%
Field of activity:
Research on tropical fruits

Par. Org.: Ministère de l'Economie Rurale (Niger)

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) - Mission au Niger (NG. 160)

NIGERIA (NI)

FRAME-WORK OF RESEARCH IN THE FEDERAL REPUBLIC OF NIGERIA

Agricultural Research in Nigeria is at present undertaken by a number of organizations broadly classified into three, namely:
(*i*) Government Research Department of the Ministries of Agriculture and Natural Resources.
(*ii*) Semi-autonomous Commodity Research Institutes and
(*iii*) the Universities and affiliated Institutes and some commodity oriented private organisations.

Research in Food Crops, Livestock, Forestry and Fisheries is undertaken by the Government Departments of Research and University affiliated Institutes, and research on the main tree crops is undertaken by the Commodity Research Institutes. The Faculties of Agriculture of the Universities contribute to research in food crops while commodity oriented private organizations such as the Nigeria Tobacco Company and the Nigeria Sugar Company conduct research into the problems of production of these crops. A semi-autonomous Research Institute conducts research into Trypasonomiasis, an important disease of livestock in Nigeria.

The Governments provide funds for the research activities of the Research Departments and the Research Institutes and to a lesser extent for University Research.

The Agricultural Research Council of Nigeria has just been established, and it will be responsible for, among other functions, coordination of agricultural research and for its funding.

NI. 060 — INSTITUTE FOR AGRICULTURAL RESEARCH (IAR)

Samaru
PMB 1044, Zaria

Par. Org.: Ahmadu Bello University, Zaria

NI. 090 — COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN)

PMB 5244, Ibadan
Tel. Add.: CRIN - IBADAN
Tel.: Ibadan 613-60-2

The headquarters of this Institute are on GAMBARI EXPERIMENTAL STATION (NI. 091) where the specialized divisions and the main laboratories are located.

Research in the field is carried out on this station and on the substations of OCHAJA (NI. 092), UHONMORA (NI. 093), MAMBILLA PLATEAU (NI. 094), OWENA (NI. 095), BENDE (NI. 096) and IKOM (NI. 097).
Publications:
Annual Reports - Occasional articles published in "Nigerian Agricultural Journal," "Proc. of the Biennal Cocoa Conference," "Tropical Agriculture," "Turrialba," "Cacao," "Annuals of Applied Biology," "Nigerian Entomologist Magazine," "Journal of Horticultural Science."
Field of activity:

Cocoa, coffee, kola and cashew nut - (Soil chemistry, genetics, general physiology, plant biology, agronomy and plantation management, plant pathology and entomology, soil management, crop production, crop protection, human nutrition, food technology, other uses of cocoa).

Par. Org.: Agricultural Research Council of Nigeria

NI. 091 — GAMBARI EXPERIMENTAL STATION (CRIN)

PMB 5244, Ibadan
Tel. Add.: CRIN IBADAN
Tel.: Ibadan 61360 - 2

Location: E. 03.51 - N. 07.23 - 200 m
Climate: 1131 - Soils: LF-LP-LG
Staff: 30 scientists, 110 technicians - Language: English
Experimental fields:
Non-irrigated crops: 1,500 Ha
Specialized equipment:
Sample chocolate manufacturing equipment - Radioisotope laboratory equipment - photominerograph equipment - Warburg manometer - PYE unicam ultra-violet recording spectrophotometer SP 8000 - Field germplasm collection of cocoa, kola, coffee - Herbarium - Weeds of cocoa, kola, coffee and cashew farm - Fractional distillation unit with vacuum rotary evaporator - Lloyd gas analyser - chromatographic equipment
Training facilities:
Hand pollination techniques for increasing cocoa and kola productivity (4 weeks) - Cocoa rehabilitation techniques (2 weeks) - Nursery techniques (4 weeks) - Any course on any aspect of cocoa, kola, coffee, cashew production on request by Ministries of Agriculture
Library and documentation:
2,000 volumes - Specialized card indexes - reprographic unit
Publications: see NI. 090
Financial support: $2,128,000
Government of Nigeria 100%
Field of activity: see NI. 090

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 092 — OCHAJA SUBSTATION (CRIN)

Ochaja, Kwara State

Location: E. 07.36 - N. 07.30 - 300 m
Climate: 1482 - Soils: ND
Staff: 6 technicians - Language: English
Experimental fields:
Non-irrigated crops: 50 Ha
Training facilities:
Nursery techniques (2 weeks)
Financial support: $82,360
Government of Nigeria 100%

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 093 — UHONMORA SUBSTATION (CRIN)

Uhonmora, Mid-Western State

Location: E. 06.30 - N. 06.15 - 200 m
Climate: 1132 - Soils: AF
Staff: 5 technicians - Language: English
Experimental fields:
Non-irrigated crops: 105 Ha
Training facilities:
Nursery techniques (2 weeks) - Cocoa, kola, coffee husbandry (6 weeks) - Kola hand pollination techniques (4 weeks)
Financial support: $92,300
Government of Nigeria 100%

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 094 — MAMBILLA PLATEAU SUBSTATION (CRIN)

Mambilla Plateau, North Eastern State

Location: E. 11.00 - N. 07.51
Climate: 1482 - Soils: I-RD-GH-NH
Staff: 3 technicians - Language: English
Experimental fields:
Non-irrigated crops: 14 Ha
Specialized equipment:
Coffee pulping machine - Coffee hulling machine
Training facilities:
Coffee husbandry techniques (4 weeks)
Financial support: $30,400
Government of Nigeria 100%
Field of activity:
Plant breeding (coffee)

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 095 — OWENA SUBSTATION (CRIN)

Owena, Western State

Location: E. 05.00 - N. 07.00 - 250 m
Climate: 1131 - Soils: ?
Staff: 1 technician - Language: English
Experimental fields:
Non-irrigated crops: 34 Ha
Financial support: $118,560
Government of Nigeria 100%
(New station)

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 096 — BENDE SUBSTATION (CRIN)

Bende, East Central State

Location: E. 08.00 - N. 05.45 - 100 m
Climate: 1132 - Soils: AF-AG
Staff: 1 technician - Language: English
Experimental fields:
Non-irrigated crops: 40 Ha
Financial support: $112,480
Government of Nigeria 100%

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 097 — IKOM SUBSTATION (CRIN)

Ikom, South Eastern State

Location: E. 08.48 - N. 06.06 - 130 m
Climate: 1132 - Soils: ND-FR
Staff: 2 technicians - Language: English
Experimental fields:
Non-irrigated crops: 66 Ha - Forest: 734 Ha
Training facilities:
Nursery techniques (2 weeks) - Kola hand pollination techniques (4 weeks)
Financial support: $66,760
Government of Nigeria 100%

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Cocoa Research Institute of Nigeria - CRIN (NI. 090)

NI. 110 — NATIONAL ROOT CROPS RESEARCH INSTITUTE OF NIGERIA

Umudike, Umahia, Ibeku

The headquarters of this Institute are on UMUDIKE AGRICULTURAL RESEARCH AND TRAINING STATION (NI. 111)

Publications:
Occasional articles published in "Tropical Agriculture," "Trinidad," "Agriculture Society of Nigeria," "Journal Science Association of Nigeria"
Field of activity:
Oriented fundamental and applied reesarch on cassava, yam and sweet potato - Improvement of yield and disease resistance through selection and cross breeding - Improvement of cropping, storage and processing methods.

Par. Org.: Agricultural Research Council of Nigeria

NI. 111 — UMUDIKE AGRICULTURAL RESEARCH AND TRAINING STATION

Umudike, Umudike Ibeku, East Central State

Location: E. 07.33 - N. 05.29 - 120 m
Climate: 1123 - Soils: ND-FO-QF
Staff: 44 scientists, 24 technicians - Language: English
Experimental fields:
Non-irrigated crops: 172 Ha - Pastures: 36 Ha
Forest: 158 Ha - Ponds for pisciculture: 1 Ha
Specialized equipment:
This station is presently being re-organized. Among the equipment planned: a spectrometer and special equipment for trace element analysis.
Training facilities:
School of Agriculture training up to intermediate level: animal husbandry, field extension, crop husbandry, farm mechanization, plant protection, agricultural economics, soil and fertilizer and veterinary hygiene (2 years).
Library and documentation:
900 volumes
Publications: see NI. 110
Financial support: $1,140,000
Government of Nigeria 100%

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: National Root Crops Research Institute (NI. 110)

NI. 130 — FEDERAL DEPARTMENT OF AGRICULTURAL RESEARCH (FDAR)

PMB 5042, Moor Plantation, Ibadan
Tel. Add.: AGRIFED - IBADAN
Tel.: Ibadan 228-21

Field of activity:
Plant breeding - Plant pathology - Entomology - Crop husbandry - Soil chemistry - Soil fertility

Par. Org.: Federal Ministry of Agriculture and Natural Resources of Nigeria

NI. 131 — MOOR PLANTATION

PMB 5042, Ibadan

Location: E. 03.80 - N. 07.20 - 200 m
Climate: 1131 - Soils: ?
Field of activity: see NI. 130

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI. 130)

NI. 132 — BADEGGI RICE RESEARCH STATION

Badeggi, via Minna

Location: E. 05.50 - N. 09.00
Climate: 1482 - Soils: ?

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI. 130)

NI. 133 — SOIL FERTILITY UNIT

at NIFOR
Benin City, Mid-Western State

Location: E. 05.37 - N. 06.33 - 147 m
Climate: 1132

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI. 130)

NI. 134 — UYO AGRICULTURAL RESEARCH STATION

Uyo, South Eastern State

Location: E. 08.00 - N. 05.00
Climate: 1123 - Soils: ?

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI .130)

NI. 135 — UMUDIKE AGRICULTURAL RESEARCH STATION

Umudike, East Central State

Location: E. 08.00 - N. 05.15
Climate: 1132 - Soils: ?

Par. Org. Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI. 130)

NI. 136 — MOKWA AGRICULTURAL RESEARCH STATION

North Eastern State

Location: E. 04.50 - N. 09.20
Climate: 1482 - Soils: ?

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI. 130)

NI. 137 — BACITA AGRICULTURAL RESEARCH STATION

Location: E. 04.40 - N. 09.10
Climate: 1482 - Soils: ?

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Agricultural Research - FDAR (NI. 130)

NI. 150 — FOREST RESEARCH INSTITUTE OF NIGERIA (FRIN)

PMB 5054, Ibadan
Tel. Add.: FORSEARCH - IBADAN
Tel.: Ibadan 247-21

Location: E. 03.52 - N. 07.24 - 195 m
Climate: 1131
Staff: 34 scientists, 75 technicians - Language: English
Specialized equipment:
Equipment for timber testing, germinators, spectrophotometers, etc.
Training facilities:
Has the responsibility of the Federal Schools of Forestry at Ibadan and Jos. Apart from the training of technical staff, courses are organized for sawmillers and others in the timber industry.
Library and documentation:
17,000 volumes - Centralized Title Service Cards of the Oxford Forestry Bureau
Publications:
Information bulletin, books, journals, research papers and technical notes
Financial support: $650,000
Government of Nigeria 100%
Field of activity:
Ecology - Hydrology - Forestry and forest products - General physiology - Taxonomy

Par. Org.: Agricultural Research Council of Nigeria

NI. 151 — SAVANNA FORESTRY RESEARCH STATION

PMB 1039, Samaru, Zaria, North Central State
Tel. Add.: SAVANNA - ZARIA
Tel.: Zaria 2591

Location: E. 07.36 - N. 11.10 - 680 m
Climate: 1484
Staff: 11 scientists, 10 technicians - Language: English
Experimental fields:
Forest: 120 Ha
Specialized equipment:
Plant growth chambers, Neutron probe
Library and documentation:
2,100 books and papers (possible reproduction)
Financial support: $615,000
Government of Nigeria 75%
Multilateral 25%
Field of activity:
Study of site evaluation for plantation development in the Savanna region - Soil surveys - Study of the plantation silviculture

Par. Org.: Agricultural Research Council of Nigeria
FAO/UNDP

Exec. Ag.: Forest Research Institute of Nigeria (NI. 150)
FAO Forestry Department (UN. 120)

NI. 190 — FEDERAL DEPARTMENT OF FISHERIES

PMB 12529, Lagos

Field of activity:
Oceanography - Hydrobiology - Continental marine fisheries - Fish husbandry

Par. Org.: Federal Ministry of Agriculture and Natural Resources of Nigeria

NI. 191 — LAKE CHAD RESEARCH STATION

P.O. Box 227, Maiduguri
Tel. Add.: FEDFISH MAIDUGURI

Location: E. 13.19 - N. 13.57 - 282 m
Climate: 1534
Staff: 3 scientists, 1 technician - Language: English
Library and documentation:
100 volumes
Publications:
Participation in "Bulletin de l'IFAN," "Federal Fisheries Department Annual Reports," "Nature"
Financial support: $55,800
Government of Nigeria 100%
Field of activity:
Hydrobiology - Continental fisheries - Fish farming

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Fisheries (NI. 190)

NI. 192 — FISH CULTURE BRANCH

P.O. Box 5122, Port Harcourt
Tel. Add.: FEDFISH CARE Perm. Mag. Pharcourt

Location: E. 06.47 - N. 04.43 - 15 m
Climate: 1132
Staff: 1 scientist, 3 technicians - Language: English
Experimental fields:
Ponds for pisciculture: 3.4 Ha
Library and documentation:
10 volumes
Financial support: $205,000
Government of Nigeria 100%
Field of activity:
Fish farming (continental and maritime)

Par. Org.: Federal Ministry of Agriculture and Natural Resources (Nigeria)

Exec. Ag.: Federal Department of Fisheries (NI. 190)

NI. 193 — BUGUMA RESEARCH STATION

PMB, Buguma

Par. Org.: Federal Ministry of Agriculture and Natural Resources

Exec. Ag.: Federal Department of Fisheries (NI. 190)

NI. 220 — NIGERIAL STORED PRODUCTS RESEARCH INSTITUTE — LAGOS

PMB 12543, Lagos
Tel. Add.: NISPRI - LAGOS
Tel.: 48201 - 42203

Location: E. 03.50 - N. 06.50 - 10 m
Climate: 1123
Staff: 3 scientists, 10 technicians - Language: English
Specialized equipment:
Thermal conductivity meter - Avrometer - Marconi moisture meter - Scot-mec axle moisture meter - Copra moisture tester - Mettler balance - Binocular dissecting microscope - Kisopan microscope - pH meter - Spectrophotometer - Mechanical calculator - Two ventilated ovens - One incubator - One cooled incubator
Training facilities:
Training at laboratory technician level in basic analytical work relevant to stored products E.G.F.F.A. and oil context, moisture content analysis (6 weeks)
Library and documentation:
100 volumes - Index of authors - Classified separates and related reports
Publications:
Annual reports of NSPRI
Financial support: $48,640
Government of Nigeria 100%
Field of activity:
Research into the conservation of food supplies - Entomology - Insecticide testing - Chemistry - Animal health (mycotoxina)

Par. Org.: Federal Ministry of Trade (Nigeria)

Exec. Ag.: Nigerian Stored Products Research Institute NSPRI (NI. 220)

NI. 221 — NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE — IBADAN

PMB 5044, Ibadan
Tel. Add.: NISPRI - IBADAN
Tel.: 227-08

Location: E. 03.80 - N. 07.45 - 250 m
Climate: 1131
Staff: 3 scientists, 5 technicians - Language: English
Specialized equipment:
Three cooled incubators - One autoclave - Two microscopes - One meltler balance - Two facit calculators - Air bath Soxhlet sets - Water bath - Marconi moisture meltler
Training facilities:
Training at laboratory technician level in basic analytical work on F.F.A. oil content and moisture contents of oil seeds and grain - Isolation techniques for fungi
Library and documentation:
100 volumes, classified separates
Financial support: $48,640
Government of Nigeria 100%
Field of activity: see NI. 220

Par. Org.: Federal Ministry of Trade (Nigeria)

Exec. Ag.: Nigerian Stored Products Research Institute - NSPRI (NI. 220)

NI. 222 — NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE — KANO

PMB 3032, Kano
Tel. Add.: NISPRI - KANO
Tel.: Kano 3372

Location: E. 08.50 - N. 12.00 - 400 m
Climate: 1916
Staff: 3 scientists, 5 technicians - Language: English
Specialized equipment:
BURKHARD Autospot - Plate chromatography equipment - Four air bath Soxhlet sets - U.V. (black lamp) - Spectrophotometer - Ventilated ovens - Balances - Thermostat bridge
Training facilities:
Training at laboratory technician level in basic analytical work on F.F.A. oil content, moisture content of oil seeds and grain insecticide and alflatoxin determinations (6 weeks)
Library and documentation:
100 volumes, classified separates and related reports
Financial support: $48,640
Government of Nigeria 100%
Field of activity: see N. 220

Par. Org.: Federal Ministry of Trade (Nigeria)

Exec. Ag.: Nigerian Stored Products Research Institute - NSPRI (NI. 220)

NI. 223 — NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE — PORT HARCOURT

PMB 5063, Port Harcourt
Tel. Add.: NISPRI - PORTHARCOURT
Tel.: 21109

Location: E. 07.00 - N. 04.75 - 10 m
Climate: 1123
Staff: 1 scientist, 2 technicians - Language: English
Specialized equipment:
U.V. lamp - Soxhlet equipment - Ventilated ovens - Chemical laboratory in course of re-organization
Library and documentation:
20 volumes
Publications:
Contribution to the Annual Report of NSPRI
Financial support: $42,560
Government of Nigeria 100%
Field of activity: see N. 220

Par. Org.: Federal Ministry of Trade (Nigeria)

Exec. Ag.: Nigerian Stored Products Research Institute - NSPRI (NI. 220)

NI. 224 — FEDERAL PRODUCE INSPECTION SERVICE — SAPELE

Sapele
Tel. Add.: FEDPROD - SAPELE

Location: E. 05.45 - N. 05.55 - 10 m
Climate: 1132
Staff: 2 technicians - Language: English
Specialized equipment:
Thermohydrographs - Whirling - Hygrometer
(New laboratory in course of construction)
Financial support: $6,080
Government of Nigeria 100%

Par. Org.: Federal Ministry of Trade (Nigeria)

Exec. Ag.: Nigerian Stored Products Research Institute - NSPRI (NI. 220)

NI. 270 — NIGERIAN INSTITUTE FOR OIL PALM RESEARCH (NIFOR)

PMB 1030, Benin City
Tel. Add.: PALMS - BENIN-CITY
Tel.: Benin 53

Location: E. 05.37 - N. 06.33 - 147 m
Climate: 1132 - Soils: ND-QF-FO
Staff: 26 scientists, 44 technicians - Language: English
Experimental fields:
Non-irrigated crops: 1080 Ha - Irrigated crops: 8 Ha
Pastures: 40 Ha
Specialized equipment:
Computer IBM 1130 - Technician Auto analyzer II - 290B Perking Elmer atomic absorption spectrophotometer - Pye Unicam gas chromatograph - Reinchert microscope NR. 316570 with Reinchert camera NR. 58972 - Moisture and density measuring equipment NE. 8401.
Training facilities:
Diploma in oil palm work: seed production, germination, technique, nursery management, plantation establishment, soil and plant nutrition, milling, crop protection (10 weeks)
Library and documentation:
6,000 volumes - Card index on oil palm literature - reprographic equipment
Publications:
NIFOR Annual Report - NIFOR Journal
Financial support: $1,650,000
Government of Nigeria 100%
Field of activity:
Oil palm: Agronomy - Plant breeding - Plant nutrition - Plant pathology - Plant physiology - Research engineering - Soil chemistry - Statistics

Par. Org.: Agricultural Research Council of Nigeria

NI. 280 — RUBBER RESEARCH INSTITUTE OF NIGERIA (RRIN)

PMB 1049, Benin City
Tel. Add.: RUBSEARCH - BENIN

Location: E. 05.35 - N. 06.09 - 30 m
Climate: 1132 - Soils: ND-FO-QF
Staff: 6 scientists, 38 technicians - Language: English
Experimental fields:
Non-irrigated crops: 336 Ha
Specialized equipment:
Atomic absorption spectrophotometer - Crumb processing machines
Training facilities:
Tapping - Budgrafting - Processing - Chemistry quality control - Disease control - Agronomy (12 weeks)
Publications:
Annual report of the RRIN - Tourist guide to RRIN revised every two years - Advisory circulars
Financial support: $302,000
Government of Nigeria 100%
Field of activity:
Soil chemistry - Polymer chemistry - Genetics - Plant breeding (rubber) - Plant nutrition - Meteorology - Soil conservation - Water conservation (irrigation) - Agronomy - Plant pathology - Crop production and protection (rubber)

Par. Org.: Agricultural Research Council of Nigeria

NI. 320 — FACULTY OF AGRICULTURE (UNIVERSITY OF IBADAN)

Ibadan, Western State

The Department of Agronomy of this Faculty has a radioisotope laboratory (NI. 831) where research is carried out in cooperation with the Joint FAO/IAEA division of Atomic Energy in Food and Agriculture (UN. 118)

Par. Org.: University of Ibadan

NI. 360 — FACULTY OF AGRICULTURE (UNIVERSITY OF IFE)

Ile - Ife, Western State
Tel. Add.: IFEVARSITY - IFE
Tel.: 2291/228

Location: E. 04.40 - N. 07.30 - 300 m
Climate: 1131 - Soils: LF-LG-LP-NE-GE
Staff: 50 scientists, 11 technicians - Language: English
Experimental fields:
Non-irrigated crops: 120 Ha - Irrigated crops: 1 Ha
Pastures: 25 Ha - Forest: 150 Ha
Ponds for pisciculture: 4.5 Ha
Specialized equipment:
Computer - Crop collection nursery - Insect collection
Training facilities:
B.Sc. Agriculture (93 weeks)
Library and documentation:
75,000 volumes - Author and subject card indexes - Photocopying equipment
Publications:
Annual research report of the Faculty of Agriculture issued by University of Ife press.
Financial support: $975,000
Government of Nigeria 84%
Bilateral 16%
Field of activity:
General chemistry - Organic chemistry - Biochemistry - Biophysics - Genetics - General physiology - Plant biology - Meteorology - Nutrition - Soil management - Hydrology - Crop production and crop protection - Animal production and animal products - Animal health - Food technology

Par. Org.: University of Ife

NI. 460 — FACULTY OF AGRICULTURAL SCIENCES (UNIVERSITY OF NIGERIA)

Nsukka, East Central State
Tel. Add.: NIGERISITY - NSUKKA
Tel.: Nsukka 48

Par. Org.: Agricultural Research Council of Nigeria
University of Nigeria

NI. 461 — DEPARTMENT OF PLANT/SOIL SCIENCE (UNIVERSITY OF NIGERIA)

Nsukka, East Central State

Location: E. 07.05 - N. 07.00 - 380 m
Climate: 1482 - Soils: FO-ND-BF
Staff: 13 scientists, 19 technicians - Language: English
Experimental fields:
Non-irrigated crops: 8 Ha - Pastures: 1 Ha
Specialized equipment:
5 greenhouses - 1 crop collection
Training facilities:
Undergraduate and post-graduate courses in soil science and crop science (3 terms of 33 weeks)
Library and documentation:
100 volumes of departmental books
Publications:
Articles published in various learned journals in crops and soil sciences

Field of activity:
Activities mainly aimed at observation, demonstrations and maintaining a crop collection

Par. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Faculty of Agricultural Sciences of the University of Nigeria (NI. 460)

NI. 462 — DEPARTMENT OF VETERINARY SCIENCE (UNIVERSITY OF NIGERIA)

Nsukka, East Central State

Location: E. 07.05 - N. 07.00 - 380 m
Climate: 1482

Parg. Org.: Agricultural Research Council of Nigeria

Exec. Ag.: Faculty of Agricultural Sciences of the University of Nigeria (NI. 460)

NI. 550 — FEDERAL INSTITUTE OF INDUSTRIAL RESEARCH

PMB 1023, Ikeja Airport
Tel. Add.: APPLIED - IKEJA
Tel.: 321-61 - 343-37 - 340-99

Location: N. 06.25 - E. 03.25 - 15 m
Staff: 31 scientists, 52 technicians - Language: English
Specialized equipment:
Amino acid analyser
Library and documentation:
5,300 volumes - 162 journals - 40 bulletins
Publications:
Quarterly reports - Annual reports - Research reports - Technical memoranda - Industrial abstracts - Bulletin for industry
Field of activity:
Food technology - Food biology - Agricultural economy

Par. Org.: Industrial Research Council of Nigeria

NI. 810 — INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE

Oyo Road, PMB 5320, Ibadan
Tel. Add.: TROPFOUND IKEJA
Tel.: 237-41 (5 lines)

Location: E. 04.00 - N. 07.30 - 210 m
Climate: 1131 - Soils: LF-BF
Staff: 40 scientists, 100 technicians - Language: English (sec. French)
Experimental fields:
Non-irrigated crops: 100 Ha - Irrigation crops: 60 Ha
Specialized equipment:
Gas chromatograph - Atomic absorption spectrophotometer - Nuclear magnetic resonance analyser - infra-red spectrophotometer - Technician auto-analyser - Differential thermo-analyser - Liquid scientillation counting system
Library and documentation:
6,500 volumes with growth rate of 2,000 volumes per year - Approximately 1,000 periodical titles
Publications:
Annual Review - Newsletter - Programme Brochures - Proceedings of Seminars - Conferences, Workshops
Financial support: $5,500,000
Bilateral 76%
Multilateral 1,5%
Private 22,5%
Field of activity:
Soil physics - Agroclimatology - Soil chemistry - Agronomy - Biochemistry - Tissue culture - Cytogenetics - Plant pathology - Entomology - Nematology - Soil microbiology

No parent organization

NI. 831 — ISOTOPE LABORATORY OF THE DEPARTMENT OF AGRONOMY (UNIVERSITY OF IBADAN)

Ibadan

Location: E. 03.80 - N. 07.20 - 200 m
Staff: 4 scientists, 3 technicians - Language: English
Specialized equipment:
Neutron moisture meter
Financial support: $16,000
Mutilateral 28%
Field of activity:
Use of isotopes in agricultural research

Par. Org.: International Atomic Energy Agency
University of Ibadan

Exec. Ag.: Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture (UN. 118)
Faculty of Agriculture of the University of Ibadan

SENEGAL (SG)

SG. 110 — CENTRE CTFT AU SÉNÉGAL

BP. 2312, Dakar
Tel. Add.: CETEFO - DAKAR
Tel.: 36478

This body is the representative in Senegal of the Centre Technique Forestier Tropical (CTFT) - (FR. 110), Avenue de la Belle Gabrielle 93, Nogent-sur-Marne (France).

This centre includes the Forestry Station at HANN (SG. 111), the Sub-Stations of BAMBEY (SG. 112) and of DJIBELOR (SG. 113) and the Division des Recherches Piscicoles at RICHARD-TOLL (SG. 114)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère du Développement Rural du Sénégal

SG. 111 — STATION FORESTIÈRE DE HANN (CTFT)

Parc de Hann - BP. 2312, Dakar
Tel. Add.: CETEFO - DAKAR
Tel.: 364-78

Location: W. 17.26 - N. 14.43 - 4 m
Climate: 1320 - Soils: RE
Staff: 2 scientists, 1 technician - Language: French
Special Equipment:

Frame for cuttings under " mist " spray
Library and documentation:
420 volumes - Oxford classification card system - Photocopying apparatus
Publications:
Annual reports
Field of activity:
Protection and reclamation of soils - Silviculture - Reafforestation - Introduction of exotic species resistant to drought and salinity.
To this station are attached the Sub-stations of BAMBEY (SG. 112) and of DJIBELOR (SG. 113) and the following experimental outstations, the financial support of which is ensured by:
Senegal Government 50%
Bilateral 50%
OUTSTATION AT SINE-SALOUM
W. 16.11 - N. 14.02 - 6 m
Climate: 1532 - Soils: JE-ZO
Forest: 14 Hh
Financial support: $25,000
OUTSTATION AT ROSS-BETHIO
W. 16.04 - N. 16.16 - 6 m
Climate: 1540 - Soils: ZO-QL
Forest: 35 Ha
Financial support: $15,200
OUTSTATION AT LINGUERE
W. 15.09 - N. 15.23 - 21 m
Climate: 1534 - Soils: QL
Forest: 3 Ha
Financial support: $14,000

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre au Sénégal (SG. 110)

SG. 112 — SOUS-STATION FORESTIÈRE DE BAMBEY (CTFT)

Bambey

Location: W. 16.20 - N. 14.42 - 20 m
Climate: 1532 - Soils: VC
Staff: 1 technician
Experimental fields:
Forest: 15 Ha
Financial support: $21,850
Senegal Government ½
Bilateral . . . . . ½

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre au Sénégal (SG. 110)

SG. 113 — SOUS-STATION FORESTIÈRE DE DJIBELOR (CTFT)

Djibelor

Location: W. 16.18 - N. 12.34 - 12 m
Climate: 1486 - Soils: ND
Staff: 1 technician
Experimental fields:
Forest: 19 Ha
Financial support: $13,600
Senegal Government ½
Bilateral . . . . . ½

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre au Sénégal (SG. 110)

SG. 114 — DIVISION DES RECHERCHES PISCICOLES (CTFT)

BP. 28, Richard-Toll
Tel.: Richard-Toll 2

Location: W. 15.42 - N. 16.27 - 7 m
Climate: 1540
Staff: 1 scientist - Language: French
Library and documentation:
90 volumes
Publications:
Annual reports
Financial support: $51,500
Senegal Government ½
Bilateral . . . . . ½
Field of activity:
Continental fisheries - Biology of species

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Centre au Sénégal (SG. 110)

SG. 131 — LABORATOIRE NATIONAL DE L'ÉLEVAGE ET DE RECHERCHES VÉTÉRINAIRES (IEMVT)

BP. 2057, Dakar
Tel. Add.: LABELEVAGE - DAKAR
Tel.: Dakar 320-65 - 320-66 - 320-67

Location: W. 17.25 - N. 14.45 - 10 m
Climate: 1320
Staff: 17 scientists, 21 technicians - Language: French (occ. English)
Experimental fields:
Irrigated crops: 7 Ha - Pastures: 493 Ha
Teaching and popularization:
Pathology of infectious diseases (3 to 6 months) - Pathology of parasitic diseases (3 to 6 months) - Physiopathology of nutrition (3 to 6 months) - Zootechny (3 to 6 months)
Library and documentation:
11,000 works and scientific reviews - 1,834 microfilms - 5 films - 58 maps - 120 periodicals
Publications:
Participation in " Revue d'Elevage et Médecine Vétérinaire des Pays Tropicaux " published by IEMVT (France) - " Bulletin de l'O.I.E." - " C.R. Académie des Sciences."
Financial 1 support: $56,620
Senegal Government ½
Bilateral . . . . . ½
Field of activity:
Animal health (bacteriology, virology, helminthology, entomology, protozoology) - Physiology - Pathology - Nutrition and biochemistry - Agrostology - Chemistry of nutrition - Zootechny

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (IEMVT) - France (FR. 120)

SG. 132 — CENTRE DE RECHERCHES ZOOTECHNIQUES DE DARA-DJOLOFF — IEMVT

Dara
Tel. Add.: DARA - DJOLOFF
Tel.: Dara 11

Location: W. 15.29 - N. 15.20 - 50 m
Climate: 1534
Staff: 2 scientists - Language: French (occ. English)

Experimental fields:
Pastures: 6,800 Ha
Publications:
Participation in " Revue d'Elevage et de Médecine Vétérinaire des Pays Tropicaux " published by IEMVT (France)
Financial support: $51,300
Senegal Government ½
Bilateral . . . . . ½
Field of activity:
Agrostology - Animal production and animal products (improvement of the bovine and equine species, artificial insemination)

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (IEMVT) - France (FR. 120)

SG. 150 — AGENCE IRAT DU SÉNÉGAL

Bambey

Tel. Add.: NORAGRO - BAMBEY
This body is the representative in Senegal of the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - (FR. 130), 110 rue de l'Université, Paris VII^{e}, France

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère du Développement Rural du Sénégal

SG. 151 — CENTRE NATIONAL DE RECHERCHES AGRONOMIQUES IRAT DE BAMBEY

Bambey
Tel. Add.: NORAGRO - BAMBEY
Tel.: 843-50

Location: W. 16.28 - N. 14.42 - 18 m
Climate: 1532 - Soils: QL
Staff: 16 scientists, 23 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 640 Ha
Special Equipment:
1,500 square metres of laboratory including one sterile room
Library and documentation:
4,000 volumes - Various reviews
Publications:
Reports - Participation in " Agronomic Tropicale " published by IRAT (Paris)
Financial support: $1,282,000
Senegal Government 48%
Bilateral 46%
Multilateral 6%
Field of activity:
Genetics (selection) - Plant biology (agrobotany, physiology) - Agricultural ecology - Bioclimatology - agropedology (erosion, rivulet formation, fertility) - Hydrology - Production of harvests (early and late millets, sorghum, rice, maize, groundnuts, niele, sugar cane) - Protection of the harvests (entomology, phytopathology) - Techniques and systems of cropping - Application of radio-active tracers in agriculture - Agricultural machinery.

The research work is carried out on the Station and on the following outstations, each of which has a technician in residence, and which are totally supported financially by the Government of Senegal.

OUSTATION AT BOULEL
W. 15.45 - N. 14.15 - 35 m
Climate: 1532 - Soils: LF-I
Not irrigated crops: 30 Ha
Financial support: $3,230

OUTSTATION AT KEUR SAMBA
W. 14.50 - N. 13.50 - 25 m
Climate: 1532 - Soils: LF
Not irrigated crops: 12 Ha
Financial support: $950

OUTSTATION AT KEUR YORO-DOU
W. 16.00 - N. 13.50 - 30 m
Climate: 1532 - Soils: LF
Not irrigated crops: 10 Ha
Financial support: $270

OUTSTATION AT MAKA-KOULIBANTAN
W. 14.15 - N. 13.40 - 20 m
Climate: 1532 - Soils: ND-QL-LF
Not irrigated crops: 30 Ha
Financial support: $3,610

OUSTATION AT DJIBONKER
W. 16.30 - N. 13.20 - 15 m
Climate: 1486 - Soils: JT
Irrigated crops: 10 Ha
Financial support: $950

OUTSTATION AT DÉNDIÉBA
W. 16.10 - N. 12.50 - 30 m
Climate: 1486 - Soils: QL-LF
Not irrigated crops: 10 Ha
Financial support: $2,300

OUTSTATION AT THIÉNABA
W. 16.55 - N. 14.45 - 30 m
Climate: 1573 - Soils: QL-QC
Not irrigated crops: 10 Ha
Financial support: $2,300

OUTSTATION AT KEUR-MADIABEL
W. 16.10 - N. 13.50 - 20 m
Climate: 1532 - Soils: LF-QL
Not irrigated crops: 10 Ha
Financial support: $2,500

OUSTATION AT MANIORA
W. 16.15 - N. 13.00 - 20 m
Climate: 1486 - Soils: FA
Not irrigated crops: 10 Ha
Financial support: ?

OUTSTATION AT VÉLINGARA
W. 14.10 - N. 13.00 - 30 m
Climate: 1483 - Soils: QL-LF-BF-LG
Not irrigated crops: 30 Ha
Financial support: $2,700

OUTSTATION AT MISSIRA
W. 13.30 - N. 13.30 - 55 m
Climate: 1532 - Soils: QL-LF
Not irrigated crops: 10 Ha
Financial support: $3,300

OUTSTATION AT DIOULAKOLON
W. 14.50 - N. 13.15 - 30 m
Climate: 1484 - Soils: LF-BF
Not irrigated crops: 10 Ha
Financial support: $1,400

OUTSTATION AT FORBOTTE
W. 16.30 - N. 15.00 - 20 m
Climate: 1533 - Soils: QL
Not irrigated crops: 10 Ha
Financial support: $950

OUTSTATION AT N'DIÉMANÉ
W. 16.35 - N. 14.25 - 25 m
Climate: 1532 - Soils: LF-VC-BV
Not irrigated crops: 10 Ha
Financial support: $950

OUTSTATION AT ROF
W. 16.50 - N. 14.15 - 5 m
Climate: 1532 - Soils: BK-VC
Not irrigated crops: 10 Ha
Financial support: $1,700

OUTSTATION AT KOTIARY
W. 13.25 - N. 13.55 - 30 m
Climate: 1532 - Soils: QL-LF
Not irrigated crops: 10 Ha
Financial support: $1,700

Research work is also carried on in a peasant environment in the following experimental units, totally supported financially by the Government of Senegal.

EXPERIMENTAL UNIT AT THYSSÉ-KAYEMOR
W. 15.40 - N. 13.40 - 30 m
Climate: 1532 - Soils: LF
Financial support: $9,500

EXPERIMENTAL UNIT AT KOUMBIDIA
W. 14.45 - N. 13.50 - 40 m
Climate: 1533 - Soils: FA
Financial support: $9,500

In these experimental units, courses of technical training, alphabetisation and education in domestic science take place.

SG. 152 — STATION IRAT DE SÉFA

Séfa

Location: W. 15.32 - N. 12.47 - 40 m
Climate: 1484 - Soils: LF-FA
Staff: 1 scientist, 5 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 90 Ha
Library and documentation:
230 volumes - various reviews
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris)
Participation in the different reports of the CNRA/Bambey
Financial support: $167,200
Senegal Government ½
Bilateral . . . . . ½
Field of activity:
Genetics - Agropedology - Production and protection of the harvests (forage crops, maize, rice)

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Sénégal (SG. 150)

SG. 153 — STATION IRAT DE RICHARD-TOLL

Richard-Toll
Tel.: Richard-Toll 5

Location: W. 15.42 - N. 16.27 - 3 m
Climate: 1540 - Soils: JE-GE
Staff: 3 scientists, 4 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 100 Ha
Library and documentation:
500 volumes and reviews
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris)
Participation in the various reports of the CNRA/Bambey
Financial support: $182,400
Senegal Government 68%
Bilateral 32%
Field of activity:
Genetics - Agropedology - Production and protection of the harvests (rice, sugar cane, maize, millet, sorghum)

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Sénégal (SG. 150)

SG. 154 — STATION IRAT DE NIORO-DU-RIP

Nioro-du-rip
Tel.: Nioro 2

Location: W. 15.47 - N. 13.45 - 15 m
Climate: 1532 - Soils: LF
Staff: 5 technicians - Language: French
Experimental fields:
Not irrigated crops: 60 Ha
Financial support: $45,600
Senegal Government ½
Bilateral . . . . . ½
Field of activity:
Cropping techniques: chemical weed control (sorghum, groundnuts)

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Sénégal (SG. 150)

SG. 155 — STATION IRAT DE SINTHIOU-MALÈME

Sinthiou - Maleme

Location: W. 13.55 - N. 13.50 - 20 m
Climate: 1532 - Soils: LF
Staff: 2 technicians - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 60 Ha
Financial support: $49,400
Senegal Government ½
Bilateral . . . . . ½
Field of activity:
Cropping techniques

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Sénégal (SG. 150)

SG. 156 — STATION DE RECHERCHES RIZICOLES DE DJIBELOR (IRAT)

Ziguinchor
Tel.: 91-205

Location: W. 16.20 - N. 12.30 - 32 m
Climate: 1486 - Soils: GD-JD-JT
Staff: 4 scientists, 3 technicians - Language: French (occ. English)
Experimental fields:
Irrigated crops: 30 Ha
Publications:
Participation in "Agronomie Tropicale" published by IRAT (Paris)
Participation in the various reports of the CNRA/Bambey
Financial support: $209,000
Senegal Government 77%
Bilateral 23%
Field of activity:
Agropedology - Agrophysiology - Selection - Protection of crops - cropping techniques (irrigated rice)

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Agence au Sénégal (SG. 150)

SG. 170 — MISSION IFAC AU SÉNÉGAL

BP. 486, Dakar
Tel.: 912-12

This mission represents in Senegal the Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) - (FR. 170), 6 rue du Général Clergerie, Paris XVI[e], France

Field of activity:
Production and protection of tropical fruits

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère du Développement Rural du Sénégal

SG. 171 — STATION IFAC DE KEUR MAMA LAMINE

Inspection de l'Agriculture à Kaolack
Tel.: 870-93

Location: W. 16.22 - N. 13.46 - 23 m
Climate: 1484 - Soils: QL
Staff: 1 scientist, 1 technician - Language: French
Experimental fields:
Irrigated crops: 10 Ha
Special Equipment:
Collections of cultivars
Teaching and popularization:
Course in fruit crops intended for overseers of agriculture (1 year)
Library and documentation:
30 volumes
Publications:
Technical notes - Participation in the annual report of the IFAC/Senegal - Participation in the review "Fruits" published by the IFAC (Paris)
Financial support: $76,000
Senegal Government 100%

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) Mission au Sénégal (SG. 170)

SG. — STATION IFAC DE SINGHER

Inspection de l'Agriculture a Ziguinchor
BP. 242, Ziguinchor
Tel.: 912-63

Location.: W. 15.25 - N. 12.31 - 14 m
Climate: 1486 - Soils: ND
Staff: 2 scientists, 2 technicians - Language: French
Experimental fields:
Irrigated crops: 13 Ha
Special Equipment:
Collections of cultivars
Teaching and popularization:
Course in Fruit-tree growing intended for overseers of agriculture (1 year)
Publications:
Technical notes - Participation in the annual report of the IFAC/Senegal - Participation in the review "Fruits" published by the IFAC (Paris)
Financial support: $19,000
Senegal Government 100%

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut Français de Recherches Fruitières d'Outre-Mer (IFAC) Mission au Sénégal (SG. 170)

SG. 181 — STATION IRCT DE KAOLACK

BP. 208, Kaolack
Tel.: 204

Location: W. 16.05 - N. 14.08 - 8 m
Climate: 1532 - Soils: QL-LF-GD
Staff: 2 scientists, 1 technician - Language: French
Experimental fields:
Not irrigated crops: 25 Ha - Experimental plots dispersed in a rural environment
Teaching and popularization:
Training of probationers (1 month) - Permanent training of staff (12 months)
Publications:
Annual reports - Specialized articles - Participation in "Coton et Fibres Tropicales" published by the IRCT (Paris)
Financial support: $100,000
Multilateral 100%
Field of activity:
Varietal experimental work on cotton - Pedology - Entomology

Par. Org.: Ministère du Développement Rural (Sénégal)

Exec. Ag.: Institut de Recherches du Coton et des Textiles (IRCT) Paris (FR. 150)

SG. 800 — PROJET FAO POUR LE DÉVELOPPEMENT DE LA RECHERCHE AGRONOMIQUE DANS LE BASSIN DU FLEUVE SÉNÉGAL

BP. 154, Dakar

The research work is carried on at the agronomic station of Samé (ML. 801) at the national centre for agronomic experimental work at Kaedi (MR. 801) and at the experimental centre of Guédé (SG. 801)

Par. Org.: Plant Production and Protection Division - FAO (Rome) (UN. 113)
Organisation pour la Mise en Valeur de la Vallée du Sénégal - OMVS (Dakar)

SG. 801 — CENTRE EXPÉRIMENTAL DE GUÉDÉ

c/o Projet de Recherche Agronomique
BP. 154, Dakar

Location: W. 14.46 - N. 16.32 - 7 m
Climate: 1540 - Soils: ?
Staff: 1 scientist - Language: French (occ. English)
Experimental fields:
Irrigated crops: 17 Ha
Special Equipment:
Neutron probe
Publications:
Reports of activities
Financial support: $182,400
Senegal Government $^1/_3$
Multilateral . . . . . $^2/_3$
Field of activity:
Climatology - Agriculture

Par. Org.: Organisation pour la Mise en Valeur de la Vallée du Sénégal (OMVS)

Exec. Ag.: Projet FAO pour le Développement de la Recherche Agronomique dans le Bassin du Fleuve Sénégal (SG. 800)

SG. 830 — LABORATOIRE DE RADIOISOTOPIE DU CENTRE DE RECHERCHES AGRONOMIQUES DE BAMBEY

BP. Bambey

Location: W. 16.20 - N. 14.42 - 20 m
Staff: 2 scientists
Financial support: $6,000
Senegal Government 60%
Bilateral 40%

Field of activity:
Studies on the nutrition of plants and fertilization

Par. Org.: Ministère du Développement Rural (Sénégal)
International Atomic Energy Agency

Exec. Ag.: Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture (UN. 118)
Agence IRAT du Sénégal (SG. 150)

SIERRA LEONE (SL)

SL. 040 — VETERINARY DIVISION (MINISTRY OF AGRICULTURE)

Tower Hill, Freetown

Par. Org.: Ministry of Agriculture and Natural Resources of Sierra Leone

SL. 041 — VETERINARY RESEARCH LABORATORY

Teko, via Makeni
Tel.: Makeni 357

Location: W. 12.05 - N. 08.55 - 70 m
Climate: 1476
Staff: 2 scientists, 1 technician - Language: English
Experimental fields:
Pastures: 800 Ha
Training facilities:
A course for inoculators and vet. field assistants is expected to start next year
Library and documentation:
Books for all vet. subjects and different laboratory work - 11 vet. journals and bulletins
Publications:
Opitz, H.M. (1969) Bull. epizoot. Div. Afr. - Opitz, H.M. (1971) Research Report 1966-1970
Field of activity:
Research into animal diseases and post mortem and diagnostic work on diseased animals is carried out. Vaccine against CBPP is produced

Par. Org.: Ministry of Agriculture and Natural Resources (Sierra Leone)

Exec. Ag.: Veterinary Division (SL. 040)

SL. 050 — FACULTY OF PURE AND APPLIED SCIENCES (UNIVERSITY OF SIERRA LEONE)

P.O. Box 87, Freetown
Tel. Add.: FOURABAY - FREETOWN

Par. Org.: Ministry of Education (Sierra Leone)

SL. 060 — FOURAH BAY COLLEGE

P.O. Box 87, Freetown
Tel. Add.: FOURAHBAY - FREETOWN

Location: W. 13.13 - N. 08.29 - 250 m
Climate: 1133
Staff: 37 scientists, 37 technicians - Language: English
Specialized equipment:
Gillet and Silbert "Conference' microscope with 35 mm camera attachment - Bomb calorimeter - sorptometer - Concentration cell apparatus - Automatic balance
Training facilities:
Courses leading to the B.Sc. Degree (4 years after "O" level)
Courses leading to the B.Sc. (Hons) Degree (5 years after "O" level)
Library and documentation:
63,000 volumes - 900 periodicals
Publications:
Participation in "Fourah Bay College" and "Njala University College" publications as well as in various international and scientific journals
Field of activity:
Pedology - Biology - Ecology - Physiology

Par. Org.: Ministry of Education (Sierra Leone)

Exec. Ag.: Faculty of Pure and Applied Science (SL. 050)

SL. 071 — RICE RESEARCH STATION ROKUPR

Tel. Add.: RICE ROKUPR

Location: W. 12.57 - N. 09.01 - 5 m
Climate: 1133 - Soils: JT-FO-GD
Staff: 3 scientists, 13 technicians - Language: English
Experimental fields:
Non-irrigated crops: 10 Ha - Irrigated crops: 27 Ha
Specialized equipment:
Gene Bank store - Growth cabinet - Artificial dryer
Library and documentation:
800 volumes - 127 journales and periodicals - author and subject index cards - catalogues - microfilm and microreader - reprographic equipment
Publications:
Annual reports - Progress reports - Technical bulletins
Financial support: $24,300
Government of Sierra Leone 100%
Field of activity:
Until recently it was part of the West Africa Rice Research Institute and is now part of the West Africa Rice Development Association. It is in the process of being expanded in terms of staff and resources in order to deal with other crops in addition to rice. There is a substantial laboratory and building complex already in existence. Experimental field plots in different parts of Sierra Leone are controlled from Rokupr.

Par. Org.: Government of the Republic of Sierra Leone

Exec. Ag.: West African Rice Development Association - WARDA (LI. 840)

TOGO (TO)

TO. 020 — MISSION IRAT DU TOGO

BP. 1163, Lomé
Tel. Add.: IRATROP - LOME
Tel.: Lomé 3278

This body is the representative in Niger of the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - (FR. 130), 110 rue de l'Université, Paris VII^{e}, France

Par. Org.: Secrétariat d'Etat aux affaires Etrangères (France)
Ministère de l'Economie Rurale du Togo

TO. 021 — CENTRE EXPÉRIMENTAL IRAT DE DAVIÉ (TSÉVIÉ)

Davié

Location: E. 01.03 - N. 06.20 - 90 m
Climate: 1350 - Soils: ND
Staff: 1 research worker, 1 technician - Language: French
Experimental fields:
Not irrigated crops: 13 Ha - Irrigated crops: 13 Ha
Teaching and popularization:
Practical course intended for 2nd year students of the Ecole Nationale d'Agriculture de Tové (1 month)
Publications:
Annual reports - Syntheses and technical notes
Financial support: $28,500
Bilateral 100%
Field of activity:
Pedology and fertilization - Cropping techniques (maize, manioc)

Par. Org.: Ministère de l'Economie Rurale (Togo)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Mission du Togo (TO. 020)

TO. 022 — STATION IRAT DE TOAGA

BP. 16, Mango

Location: E. 00.30 - N. 10.07 - 300 m
Climate: 1420 - Soils: LF
Staff: 1 research worker - Language: French
Experimental fields:
Not irrigated crops: 7 Ha
Teaching and popularization:
Practical course intended for 2nd year students of the Ecole Nationale d'Agriculture de Tové (1 month)
Publications:
Annual reports - Syntheses and technical notes
Financial support: $28,500
Bilateral 100%
Field of activity:
Pedology and Fertilization - Cropping techniques (pluvial rice)

Par. Org.: Ministère de l'Economie Rurale (Togo)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Mission du Togo (TO. 020)

TO. 041 — STATION IRCT D'ANIÉ MONO

BP. 1, Anié
Tel. Add.: IRCTE - ANIE
Tel.: 3 Anié

Location: E. 01.15 - N. 07.45 - 160 m
Climate: 1411 - Soils LF-ND-VC
Staff: 3 research workers, 2 technicians - Language French
Experimental fields:
Not irrigated crops: 70 Ha - Pastures: 10 Ha
Special Equipment:
Experimental installation for cotton picking (1 picking machine, 20 continental saws "Gin")
Teaching and popularization:
Training of rural promoters (4 to 6 months)
Library and documentation:
600 works and documents - 12 collections of reviews
Publications:
Annual reports - Specialized articles - Participation in "Coton et Fibres Tropicales" published by the IRCT (Paris)
Financial support: $198,000
Togo Government 46%
Bilateral 41%
Multilateral 13%
Field of activity:
General agronomy (selection and propagation of cotton seeds) - Genetics - Meteorology

Par. Org.: Ministère de l'Economie Rurale (Togo)

Exec. Ag.: Institut de Recherches du Coton et des Textiles Exotiques (IRCT) - Paris (FR. 150)

TO. 060 — MISSION IFCC AU TOGO

BP. 90, Palimé

This mission represents in Togo the Institut Français du Café, du Cacao et autres Plantes Stimulantes (IFCC), 34 rue des Renaudes, Paris XVII^{e}, France - (FR. 180)

The research work is carried on under the direction and in part with the staff of the IFCC Research Centre in the Ivory Coast (IV. 130)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France)
Ministère de l'Economie Rurale du Togo

TO. 061 — STATION IFCC DE TOVÉ

BP. 90, Palimé
Tel.: Palimé 45

Location: E. 00.38 - N. 06.54 - 210 m
Climate: 1471 - Soils: AO
Staff: 2 research workers, 2 technicians - Language: French
Experimental fields:
Not irrigated crops: 31.6 Ha
Special Equipment:
Collection of cultivars (coffee - cacao - cola)
Library and documentation:
Specialized card-index system (coffee - cacao - cola)
Publications:
Half-yearly report of the IFCC/TOGO
Financial support: $155,800
Togo Government 25%
Bilateral 75%

Field of activity:
Production and protection of cacao (surveys and introduction, control of "swollen shoot" disease - fermentation and drying of cacao beans) - Production and protection of the canephora coffee-shrub (clonal experimental work - regeneration)

Par. Org.: Ministère de l'Economie Rurale (Togo)

Exec. Ag.: Institut Français du Café, du Cacao et autres Plantes Stimulantes (IFCC) - Mission au Togo (TO. 060)

TO. 160 — INSTITUT POLYVALENT DE RECHERCHES DE L'ÉCONOMIE RURALE

BP. 1026, Lomé

The IPRER (Institut Polyvalent de Recherches de l'Economie Rurale), whose offices are at Cacavelli (12 km. from Lomé), comprises at present six divisions, two of which are already installed: (Pedology and Nutrition). The other divisions will be installed eventually - these will comprise: the division of agronomic research, the division of socio-economic inquiries, the division of relations with foreign research institutes, the division of veterinary research and breeding stations.

The IPRER depends, as regards service, on the Minister for Rural Economy; however, the agronomic research is one of the departments of the INRS (Institut National de la Recherche Scientifique), which is itself subordinate to the Ministry for Youth, Sports and Culture in charge of scientific research.

TO. 161 — DIVISION DES ÉTUDES PÉDOLOGIQUES ET DE L'ÉCOLOGIE GÉNÉRALE

BP. 1026, Lomé
Tel.: Lomé 3096

Location: E. 01.12 - N. 06.07 - 150 m
Climate: 1350
Staff: 7 research workers - Language: French
Library and documentation:
200 volumes
Publications:
Various periodical publications having a bearing on cartography and soil studies
Field of activity:
Pedology (physical and chemical analysis of soils) - Hydrology (surface waters)

Par. Org.: Ministère de l'Economie Rurale (Togo)

Exec. Ag.: Institut Polyvalent de Recherches de l'Economie Rurale (TO. 160)

TO. 190 — CENTRE ORSTOM DE LOMÉ

BP. 375, Lomé

Location: E. 01.12 - N. 06.07 - 2 m
Staff: 5 research workers, 1 technician - Language: French
Library and documentation:
1,000 volumes
Publications:
Participation in the editing of the "Cahiers ORSTOM" (Pedology Series - Human Sciences series) published by ORSTOM (Paris)
Field of activity:
Seismology - Meteorology - Physical Oceanography (temperature, salinity, haele) - Pedology - Hydrology - Political (human) geography - Sociology

Exec. Ag.: Office de la Recherche Scientifique et technique Outre-Mer (ORSTOM) - Paris (FR. 200)

TO. 800 — PROJET FAO/UNDP DE DÉVELOPPEMENT DES RESSOURCES FORESTIERES

BP. 911, Lomé

Par. Org.: Forestry Department, FAO (Rome) - (UN. 120)

UPPER VOLTA (UV)
(HAUTE-VOLTA)

AGRICULTURAL RESEARCH ORGANIZATION

The specialist Committee for Agricultural Research is entrusted with the coordination of the activities of the various Institutes of Specialized Research Work in operation in the area.

To this end, it defines the aspect of Research work to be pursued with a view to improving agricultural production, examines the results of the studies undertaken by the different Research bodies, fixes an order of urgency for the research projects to be pursued, and finally determines the annual programmes of the experimental stations.

The Committee meets once a year. It is composed of representatives of the different research bodies in operation in Upper Volta and of representatives of the Rural Development services.

UV. 020 — AGENCE IRAT EN HAUTE-VOLTA

BP. 596, Ouagadougou

This agency represents in Upper Volta the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), 110 rue de l'Université Paris VII^{e}, France (FR. 130)

The research work is carried out in the stations at Saria (UV. 021), Parako 'Ba (UV. 022), Mogtedo (UV. 023) and Mamboinse (UV. 024) as well as in the outstations at Tankoulounga and at Dori.

Field of activity:
Soil sciences (erosion, deficiencies, maintenance of fertility, manuring). Selection, varietal improvement, cropping techniques, protection of crops (groundnuts, sesame, soya beans ...)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France) Ministère de l'Agriculture et de l'Elevage de Haute-Volta

UV. 021 — STATION DE RECHERCHES AGRONOMIQUES DE SARIA (IRAT)

Saria, via Kougougou

Location: W. 02.09 - N. 12.17 - 300 m
Climate: 1532 - Soils: ?

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence en Haute-Volta (UV. 020)

UV. 022 — STATION IRAT DE FARAKO'BA

BP. 32, Bobo-Dioulasso

Location: W. 04.30 - N. 11.00 - 380 m
Climate: 1484 - Soils: ?

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence en Haute-Volta (UV. 020)

UV. 023 — STATION D'HYDRAULIQUE AGRICOLE DE MOGTÉDO (IRAT)

Mogtédo, via Zorgho

Location: W. 00.40 - N. 12.30
Climate: 1532 - Soils: ?

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence en Volta (UV. 020)

UV. 024 — STATION AGRICOLE IRAT DE KAMBOINSÉ

Kamboinsé

Location: W. 01.55 - N. 11.55
Climate: 1532 - Soils: ?

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) Agence en Haute-Volta (UV. 020)

UV. 040 — SECTION D'EXPÉRIMENTATION IRCT EN HAUTE-VOLTA

BP. 237, Bobo Dioulasso

This section represents in Upper Volta the Institut de Recherches du Coton et des Textiles Exotiques (IRCT), 34 rue des Renaudes, Paris XVII^{e}, France (FR. 150)

Par. Org.: Secrétariat d'Etat aux Affaires Etrangères (France) Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

UV. 041 — STATION IRCT DE BOBO DIOULASSO

BP. 237, Bobo Dioulasso
Tel. Add.: IRCTE - BOBO-D
Tel.: 96-71

Location: W. 04.19 - N. 11.10 - 460 m
Climate: 1484 - Soils: LF-ND-LV
Staff: 2 scientists - Language: French
Experimental fields:
Experimental work in the African environment
Teaching and popularization:
Lectures and practical work for the O.R.D. technicians
Publications:
Reports of activities - Specialized articles - Participation in "Coton et Fibres Tropicales," published by IRCT (Paris)
Financial support: $60,023
Upper Volta Government ½
Bilateral . . . . . ½
Field of activity:
Cotton: Anatomy - Physiology (cropping techniques, manurings, moisture requirements, irrigation) - Genetics (selection) - Entomology - Phytopathology (parasitic fauna and flora, chemical control, biological control).

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches du Coton et des Textiles Exotiques (IRCT) - Section d'ex-érimentation en Haute-Volta (UV. 040)

UV. 042 — STATION IRCT D'OUAGADOUGOU

BP. 574, Ouagadougou
Tel.: 27-44

Location: W. 01.03 - N. 12.22 - 300 m
Climate: 1382 - Soils: LF-LP
Staff: 1 scientist
Experimental fields:
Experimental work in the African environment
Publications:
Reports of activities - Specialized articles - Participation in "Coton et Fibres Tropicales" published by IRCT (Paris)
Financial support: $ 40,120
Upper Volta Government ½
Bilateral . . . . . ½
Field of activity:
Cotton: Anatomy - Physiology (cropping techniques, fertilizations, moisture requirements, irrigation) - Genetics (selection) - Entomology - Phytopathology (parasitic fauna and flora, chemical control, biological control).

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches du Coton et des Textiles Exotiques (IRCT) - Section d'Expérimentation en Haute-Volta (UV. 040)

UV. 061 — STATION AGRICOLE IRHO DE NIANGOLOKO

Niangoloko via Banfora

Location: W. 04.55 - N. 10.17 - 355 m
Climate: 1484 - Soils: ?
Staff: 3 scientists - Language: French (occ. English)

Experimental fields:
Not irrigated crops: 15 Ha
Special Equipment:
Cultivars of groundnuts having early and late cycles, and resistant to " rosette " disease - Collection of wild groundnuts
Publications:
Participation in " Oléagineux, Revue Internationale des Corps Gras," published with the collaboration of the IRHO (Paris)
Financial support: $ 64,600
Upper Volta Government ½
Bilateral . . . . . ½
Field of activity:
Cropping techniques - Selection - Hybridation - Protection of crops (groundnuts, sesame).

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO) Paris (FR. 160)

UV. 062 — STATION AGRICOLE IRHO DE SARIA

BP. 21, Kougougou
Tel.: 24, Kougougou

Location: W. 02.09 - N. 12.17 - 300 m
Climate: 1532 - Soils: ?
Staff: 1 scientist - Language: French (occ. English)
Experimental fields:
Not irrigated crops: 5 Ha
Publications:
Participation in " Oléagineux (Revue Internationale des Corps Gras " published with the collaboration of the IRHO (Paris) - Participation in the annual reports of the IRHO
Financial support: $22,800
Upper Volta Government ½
Bilateral . . . . . ½
Includes the Experimental Outstation at DIEBOUGOU
Location: W. 03.15 - N. 10.52 - 290 m
Climate: 1484 - Soils: ?
Not irrigated crops: 3 Ha
Field of activity:
Selection, varietal improvement, cropping techniques (groundnuts, sesame)

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut de Recherches pour les Huiles et Oléagineux (IRHO) Paris (FR. 160)

UV. 090 — SECTION CTFT DE HAUTE-VOLTA

BP. 303, Ouagadougou
Tel.: Ouagadougou 26-71

Location: W. 01.07 - N. 12.05 - 300 m
Climate: 1532 - Soils: ?
Staff: 1 scientist, 4 technicians - Language: French
Library and documentation:
50 volumes
Field of activity:
Silviculture in the soudanian zone (bioclimatology, introduction of exotic species ...) - Soil conservation
To this station are attached the stations at LINOGHIN (UV. 091) and at DINDERESSO (UV. 092) and also the following outstations:
OUTSTATION AT GONSE
W. 01.19 - N. 12.25 - 315 m
Climate: 1532 - Soils: LP-I
Forest: 40 Ha
OUTSTATION AT DONSE
W. 01.24 - N. 12.35 - 285 m
Climate: 1532 - Soils: ?
Forest: 2 Ha
Equipment: Meteorological Station
OUTSTATION AT DORI
W. 00.03 - N. 14.03 - 290 m
Climate: 1534 - Soils: QL-WS-SO-BV
Forest: 1 Ha

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT), Centre Niger-Haute-Volta (NG. 040)

UV. 091 — STATION FORÈSTIERE DE LINOGHIN (CFTF)

BP. 303, Ouagadougou

Location: W. 01.09 - N. 12.25 - 285 m
Climate: 1532 - Soils: RE-BV-VC
Staff: 1 scientists, 1 technician - Language: French
Experimental fields:
Not irrigated crops: 6 Ha - Forest: 7 Ha
Special Equipment:
Limnigraphs - Erosion vats - Dividers - Pluviographs (recording rain-gauges)
Library and documentation:
1,400 volumes - Indexing system - Photocopying machine
Field of activity:
Protection and reclamation of the soils

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Section de Haute Volta (UV. 090)

UV. 092 — STATION FORÈSTIERE DE DINDERESSO (CFTF)

BP. 303, Ouagadougou

Location: W. 04.25 - N. 11.14 - 400 m
Climate: 1484 - Soils: ND-LG
Staff: 1 technician
Experimental fields:
Forest: 40 Ha

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Centre Technique Forestier Tropical (CTFT) - Section de Haute-Volta (UV. 090)

UV. 120 — LABORATOIRE DE DIAGNOSTIC ET DE RECHERCHES VÉTÉRINAIRES — OUAGADOUGOU

BP. 396, Ouagadougou
Tel.: Ouagadougou 24-32

Location: W. 01.07 - N. 12.05 - 300 m
Climate: 1532
Staff: 1 research worker, 4 technicians - Language: French
Teaching and popularization:
Teaching at the Ecole des Infirmiers Vétérinaires d'Ouagadougou, BEPC level (2 years): microbiology, tropical contagious diseases.
Field of activity:
Animal health (detection of contagious and parasitic diseases - epidemiological surveys)

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

UV. 201 — STATION IEMVT DE BOBO-DIOULASSO

BP. 286, Bobo Dioulasso

Location: W. 04.19 - N. 11.10 - 460 m
Climate: 1485
Staff: 1 research worker - Language: French
Special Equipment:
Caesium "Bomb"

Field of activity:
Medical and veterinary entomology - Control campaign against trypanosomiasis
Station under construction

Par. Org.: Ministère de l'Agriculture et de l'Elevage (Haute-Volta)

Exec. Ag.: Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (IEMVT) - France (FR. 120)

INSTITUTIONS AND STATIONS OUTSIDE WEST AFRICA

FR. 100 — GROUPEMENT D'ÉTUDES ET DE RECHERCHE POUR LE DÉVELOPPEMENT DE L'AGRONOMIE TROPICALE (GERDAT)

42, rue Scheffer, 75 - Paris (XVI^{e})
Tel.: Paris 553-56-41

In this grouping are included: the Secrétariat d'Etat aux Affaires Etrangères, the Caisse Centrale de Coopération Economique and eight French research institutions which are specialized in tropical agricultural research, i.e.:

Centre technique forestier tropical (CTFT) (FR. 110); Institut d'élevage et de médicine vétérinaire des pays tropicaux (IEMVT) (FR. 120); Institut français de recherches fruitières d'Outre-mer (IFAC) (FR. 170); Institut français du café et du cacao (IFCC) (FR. 180); Institut de recherches agronomiques tropicales et de cultures vivrières (IRAT) (FR. 130); Institut de recherches sur le caoutchouc en Afrique (IRCA) (FR. 140); Institut de recherches sur le coton et les textiles exotiques (IRCT) (FR. 150); Institut de recherches sur les huiles et oléagineux (IRHO) (FR. 160).

The objective of this grouping is to maximize the research activities of the members, chiefly in order to optimize the development operations in the states where the research is carried out.

FR. 110 — CENTRE TECHNIQUE FORESTIER TROPICAL (CTFT)

45 av. de la Belle Gabrielle - 94 Nogent-sur-Marne (France)
Tel. Add.: CETEFO - NOGENT SUR MARNE
Tel.: 873-32-95 Nogent-sur-Marne

A State Society endowed with civil status and with financial autonomy

Field of activity:
Research in tropical silviculture, technology of forestry products, fresh-water fisheries and pisciculture

Publications:
"Bois et forêts des tropiques"

In French West Africa the research work is carried out in the following centres and sections:

Centre CTFT en Côte-d'Ivoire	(IV. 040)
Centre CTFT Niger - Haute-Volta	(NG. 040)
Centre CTFT au Sénégal	(SG. 110)

FR. 120 — INSTITUT D'ÉLEVAGE ET DE MÉDECINE VÉTÉRINAIRE DES PAYS TROPICAUX (IEMVT)

10 rue Pierre Curie, 94 Maisons Alfort (France)
Tel. Add.: TROPELVA - MAISONS ALFORT
Tel.: Paris 368-88-73

A national public establishment enjoying civil status and financial autonomy.
Field of activity:
Biochemistry, Biophysics, Cellular Biology, Genetics, Agrostology, Bromotology (Food Science), Zoology, Taxonomy, Anatomy, Endocrinology, Animal diseases and vectors, Animal production and animal products, Animal health.
Publications:
"Revue d'Elevage et de Médecine Vétérinaire des Pays Tropicaux"

In French West Africa, research is carried out in the following centres and laboratories:

Ivory Coast	: Centre de recherches zootechniques de MINANKRO-BOUAKÉ (IV. 161)
Niger	: Laboratoire d'élevage IEMVT de Niamey (NG. 081)
Senegal	: Laboratoire national de l'élevage et de recherches vétérinaires (SG. 131)
Senegal	: Centre de recherches zootechniques de DARA-DJOLOFF (SG. 132)

FR. 130 — INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIÈRES (IRAT)

110 rue de l'Université, Paris VII^{e} (France)
Tel. Add.: IRATROP - PARIS
Tel.: Paris 551-49-79

A private association governed by the Statute of 1901
Field of activity:
Pedology, Hydrology, Production and protection of harvests, Human nutrition, Technology of food products, Application of radioactive tracers in agriculture
Publications:
"Agronomie Tropicale," a monthly review comprising three series: "Riz, riziculture et cultures vivrières tropicales," "Agronomie générale, études techniques," "Agronomie générale, études scientifiques"

In French West Africa the research work is carried out under the supervision of the following bodies:

Agence IRAT au Dahomey	(DM. 020)
Agence IRAT en Côte d'Ivoire	(IV. 020)
Agence IRAT au Mali	(ML. 060)
Agence IRAT du Niger	(NG. 020)
Agence IRAT du Sénégal	(SG. 150)
Agence IRAT du Togo	(TG. 020)
Agence IRAT en Haute-Volta	(UV. 020)

FR. 140 — INSTITUT DE RECHERCHES SUR LE CAOUTCHOUC EN AFRIQUE (IRCA)

42 rue Scheffer, Paris XVI[e] (France)
Tel. Add.: INFRANCA - PARIS
Telex: Paris 62871
Tel.: Paris 553-93-96

A private association governed by the Statute of 1901
Field of activity:
Chemistry - general and organic, Biochemistry, Phytobiology, Ecology, Pedology, Protection and cultivation of plants yielding latex, Technology of rubber
Publications:
" Revue Générale du Caoutchouc "

In French West Africa the research is carried out in the Ivory Coast at the IRCA Station of Bimbresso (IV. 091)

FR. 150 — INSTITUT DE RECHERCHES DU COTON ET DES TEXTILES EXOTIQUES (IRCT)

34 rue des Renaudes, Paris XVII[e] (France)
Tel. Add.: IRCTE - Paris
Tel.: Paris 622-53-26

A private association governed by the Statute of 1901
Field of activity:
Cotton and exotic textiles, Genetics, Agronomy, Protection of crops, Technology publications:
" Coton et Fibres Tropicales "

In French West Africa, the research is carried out under the supervision of the following bodies:

Direction Régionale IRCT au Dahomey	(DM. 040)
Station IRCT de Bouaké - Côte-d'Ivoire	(IV. 061)
Direction Régionale IRCT pour le Mali	(ML. 020)
Station IRCT de Malbaza - Niger	(NG. 051)
Station IRCT de Kaolack - Sénégal	(SG. 181)
Station IRCT d'Anié Mono - Togo	(TO. 041)
Section IRCT d'expérimentation en Haute-Volta	(UV. 040)

FR. 160 — INSTITUT DE RECHERCHES POUR LES HUILES ET OLÉAGINEUX (IRHO)

11 Square Petrarque, Paris XVI[e] (France)
Tel. Add.: INSTHUIL - PARIS
Tel.: Paris 553-60-25

A private association governed by the Statute of 1901
Field of activity:
Pedology, Production and protection of plants yielding oil, Human nutrition, Technology of oily materials, extraction and up-grading of the products
Publications:
" Oléagineux "

In French West Africa the research work is carried out under the supervision of the following bodies:

Dahomey	: Station principale IRHO de Pobé (DM. 061)
Dahomey	: Station IRHO de Sémé-Podji (DM. 062)
Ivory Coast	: Représentation permanente de l'IRHO en Côte-d'Ivoire (IV. 070)
Upper Volta	: Stations agricoles de Niangoloko et de Saria (IV. 061 et UV. 062)

FR. 170 — INSTITUT FRANCAIS DE RECHERCHES FRUITIÈRES D'OUTRE-MER (IFAC)

6 rue du Général Clergerie, Paris XVI[e] (France)
Tel. Add.: IFACOLO - PARIS
Tel.: Paris 553-16-92

Private Association, governed by the Statute of 1901
Field of activity:
Biochemistry, Phytophysiology, Production and protection of fruit plantations, Entomology, Phytopathology
Publications:
" Fruits "

In French West Africa, the research projects are carried out by the missions or sections listed below:

Mission IFAC au Dahomey	(DM. 140)
Section IFAC du Côte-d'Ivoire	(IV. 110)
Mission IFAC au Mali	(ML. 040)
Mission IFAC en Mauritanie	(MR. 050)
Mission IFAC au Niger	(NG. 160)
Mission IFAC au Sénégal	(SG. 170)

FR. 180 — INSTITUT FRANCAIS DU CAFE, DU CACAO ET AUTRES PLANTES STIMULANTES

34 rue des Renaudes, Paris XVII[e] (France)
Tel. Add.: IFRACAFE - PARIS
Tel.: Paris 622-53-26

Private Association, governed by the Statute of 1901
Field of activity:
Production and protection of the coffee-shrub, the cacao-tree, the cola-tree, the tea-shrub and other stimulating plants.
Publications:
" Café, Cacao, Thé "

In French West Africa, the research projects are carried out by:

Le Centre de Recherches IFCC en Côte-d'Ivoire (IV. 130)
La Mission IFCC du Togo (TO. 160)

FR. 200 — OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER (ORSTOM)

24 rue Bayard, Paris VIII[e] (France)
Tel. Add.: ORSTOM - PARIS
Tel.: Paris 225-31-52

A French public establishment endowed with civil status and with financial autonomy.
Field of activity:
Soil Chemistry, Genetics, General physiology, Plant biology (botany, taxonomy), Animal biology (zoology, taxonomy), Soil biology, Gravity, Magnetism, Geology, Volcanology, Geophysics, Medical entomology and helminthology, Nutrition, Pedology, Hydrology, Production and protection of the harvests, Continental and maritime fisheries, Human nutrition, Food technology, Applications of radioactive tracers in agriculture.
Publications:
Bulletin signalétique d'entomologie médicale et vétérinaire, monthly; Bulletin bibliographique de pédologie, quarterly;

Cahiers ORSTOM, quarterly; comprising five series: "Série pédologie," "Série sciences humaines," "Série géophysique," "Série physiologie des plantes tropicales" and "Série océanographie."

In French West Africa, the research work is carried out under the supervision of the following centres:

Ivory Coast: Centre ORSTOM d'Adiopodoumé (IV. 300)
Ivory Coast: Centre ORSTOM de Peht Bassah (IV. 310)
Togo : Centre ORSTOM de Lomé (TO. 190)

RP. 821 — THE INTERNATIONAL RICE RESEARCH INSTITUTE (IRRI)

Los Baños, Laguna
Tel. Add.: RICEFOUND - MANILA
Tel.: 49-81-67

Location: E. 121.00 - N. 14.00 - 39 m
Staff: 109 scientists, 46 technicians - Language: English
Experimental fields:
Irrigated crops: 67 Ha
Specialized equipment:
Rice germplasm collection - Greenhouses and growth cabinets - Phytotron
Training facilities:
Degree (M.S. and Ph.D.) and non-degree research training in various phases of rice culture (2-3 years) - Rice production training (2 weeks - 6 months) - Production and research oriented training in cropping systems (3-6 months)
Library and documentation:
31,000 books and monographs - 1,300 serial titles - International bibliography on rice research - Book copying machine - Microfilm reader and printer
Publications:
Annual reports - Annual bibliography of rice research - Bi-monthly newsletter - Technical bulletins - Reports on the international symposia organized by the Institute
Financial support: $2,900,000
Government of Philippines 45,5%
Private 54,5%
Field of activity:
Rice: Soil chemistry - Cereal chemistry - Soil microbiology - Pesticide residue analysis - Plant pathology - Entomology - Plant physiology

UN. 113 — FAO PLANT PRODUCTION AND PROTECTION DIVISION (AGP)

FAO, Rome (Italy)

Functions:

- — Advises and assists Member Governments on evaluation of agricultural production and on means to raise the level of crop productivity.
- — Advises and assists governments in the planning and implementing of national and regional agricultural development programs.
- — Assists governments in the training of technical personnel at different levels.
- — Assists governments in formulating international agreements and in developing coordinated regional projects.

In the West African countries, this Division carries out research for the:

FAO/UNDP Project - Development of Agricultural Research in the Senegal River Basin (SG. 800)

UN. 118 — JOINT FAO/IAEA DIVISION OF ATOMIC ENERGY IN FOOD AND AGRICULTURE (AGE)

Located in the Headquarters of the International Atomic Energy Agency (IAEA), Kärntnerring 11, A-1010 Vienna (Austria)

Functions:

- — Undertakes the planning, programming and co-ordination of all activities concerned with atomic energy in food and agriculture, with the executing divisions of either organization (FAO - IAEA).
- — Has scientific and technical responsibility for technical cooperation, pre-investment and other field projects of either agency.
- — Retains scientific and technical responsibility for projects concerned with atomic energy in food and agriculture and collaborates with international and regional organizations working in the same field.
- — Disseminates technical information on the use of isotopes and radiation in food and agriculture.

In the West African countries this Division carries out research at the following stations:

- — Laboratoire de Radioisotopie du CNRA de Bambey (SG. 830)
- — Radioisotope Laboratory of the Soil Research Institute (GH. 831)
- — Radioisotope Laboratory of the Cocoa Research Institute (GH. 832)

UN. 120 — FAO FORESTRY DEPARTMENT (FO)

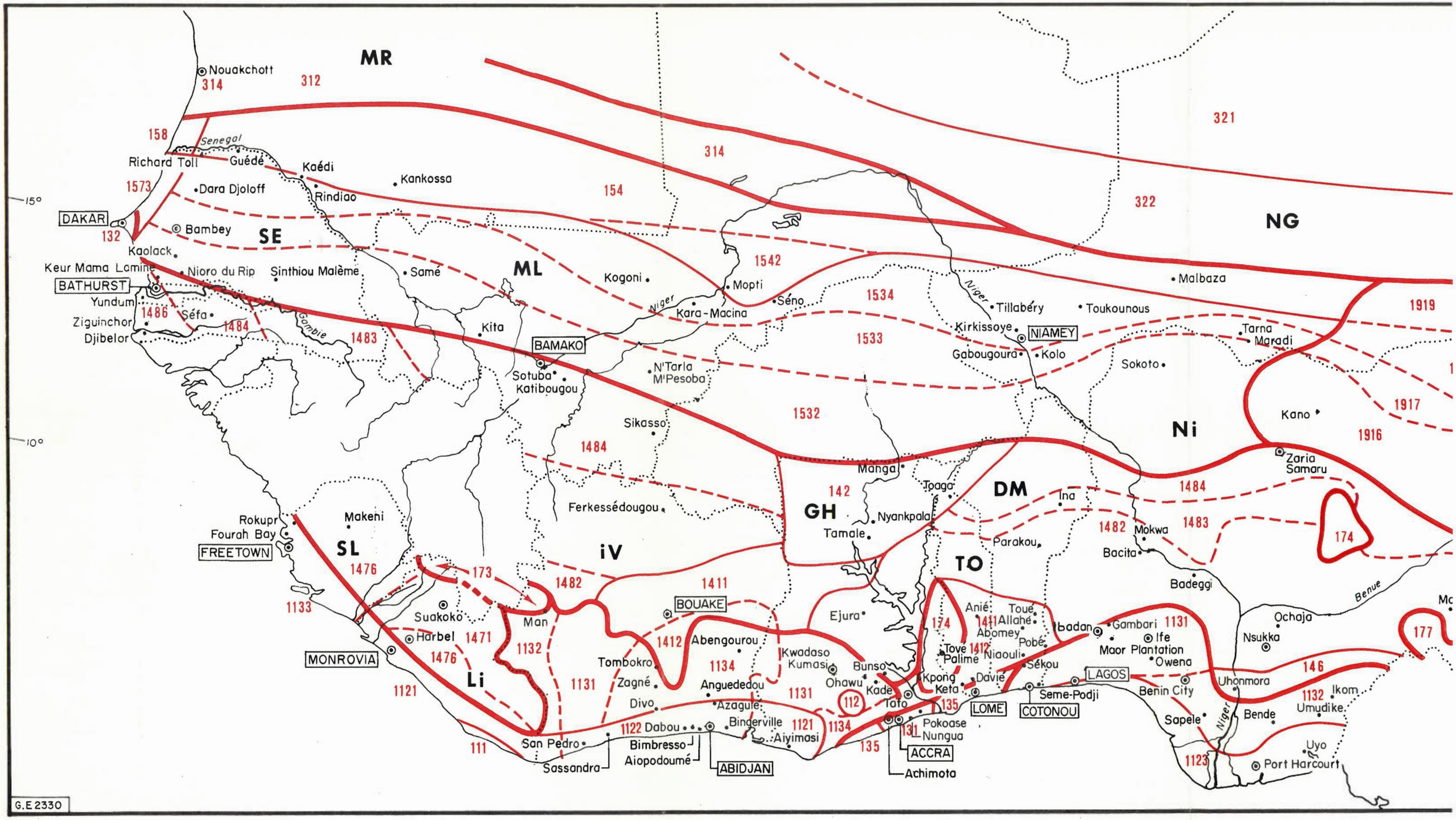
FAO, Rome (Italy)

Functions:

- — Provides direct advice and assistance to Member Governments on the formulation of forestry development programmes.
- — Operates UNDP forestry projects for which FAO is the executing agency and participates in the operation of other UNDP projects where forestry aspects are involved.
- — Collects, analyzes and disseminates information on forest policy and legislation, forest production, forestry research and the role of foretsry in the national, regional and world economy.
- — Promotes regional and world-wide cooperation in these fields and assists in the implementation of the resulting recommendations, prepares and publishes technical, economic and statistical reports on various aspects of forestry and forest industry development.

In West African countries, this Department carries out research at the following stations:

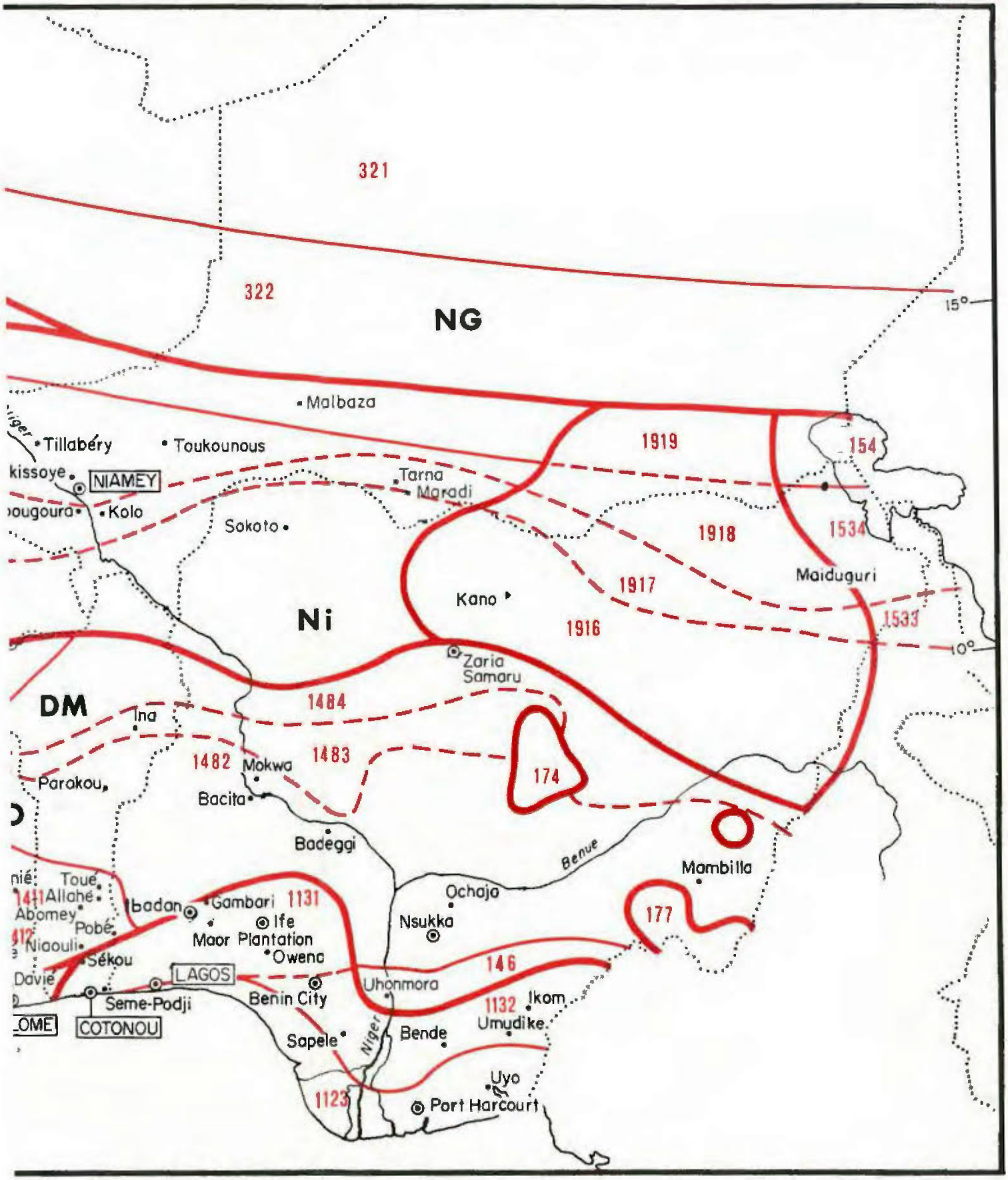
- — FAO/UNDP Project - Development of Forest Resources (TO. 800)
- — Savanna Forestry Research Station (NI. 151)



LOCATION OF AGRICULTURAL RESEARCH - INSTITUTIONS AND STATIONS

SCHEME OF MAIN CLIMATIC ZONES

After J. Papadakis



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